

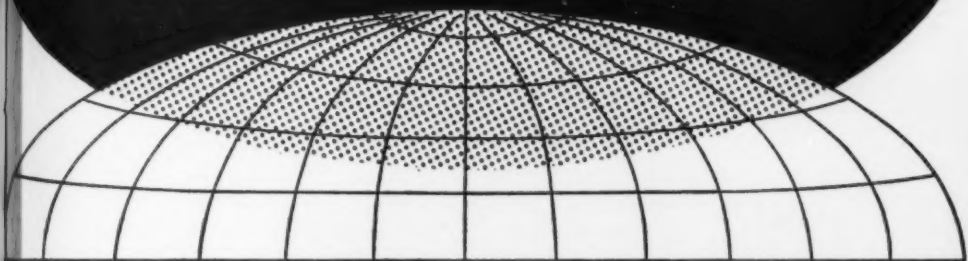
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THE CANADIAN ASSOCIATION OF GEOGRAPHERS

THE CANADIAN GEOGRAPHER



LE GÉOGRAPHE CANADIEN

L'ASSOCIATION CANADIENNE DES GÉOGRAPHES

**Number 17
November 1960**

THE CANADIAN ASSOCIATION OF GEOGRAPHERS L'ASSOCIATION CANADIENNE DES GEOGRAPHES

Founded in 1951, the Canadian Association of Geographers has as its principal objectives the exchange of ideas among geographers in Canada, the fostering of scholarship and research in geography, and the improvement of the teaching of geography.

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THE CANADIAN GEOGRAPHER

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NO. 17, NOVEMBER, 1960

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EDITOR: W. G. DEAN

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THE CANADIAN GEOGRAPHER publishes professional papers and information pertaining to geography. Articles on related subjects which have geographical interest or implication may be submitted.

Manuscripts in English or in French should be submitted on 8½ x 11 inch paper. References and footnotes should be placed in numerical order on a separate page (or pages). Note that *all copy* including references and captions should be typed double-space. A summary of 250 words should accompany the manuscripts.

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LE GÉOGRAPHE CANADIEN publie des articles écrits par des géographes et des renseignements se rapportant à la géographie. La revue présente également des études traitant de sujets apparentés à la géographie, qui comportent un intérêt ou offrent des applications géographiques.

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Presidential Address

PRESENTED AT THE
TENTH ANNUAL MEETING OF THE CANADIAN ASSOCIATION OF GEOGRAPHERS,
QUEEN'S UNIVERSITY, KINGSTON, ONTARIO, 1960

THE TASKS OF ECONOMIC GEOGRAPHY

DONALD P. KERR

University of Toronto

THE RISK that a learned society takes in electing a president is to be found not so much in its management, which seems to be effectively discharged by an energetic secretary and a competent editor, but rather in the content and delivery of the presidential address which, happily, is made the last act of his term of office. Our colleagues in the Association of American Geographers have relieved their president of this duty and have put more seasoned members to work as honorary presidents, in certain cases for a second time. I hope that our Association never grows so large or so complex that the president cannot perform this task which should, above all, attempt to mirror and mould opinion and scholarship. Having found myself faced with this assignment, I am going to chart a middle course; on the one hand neither old nor wise enough to sum up, nor on the other hand young and daring enough to discuss the whole nature and significance of geography, I propose to confine myself to what in North America is referred to as "one's field," and to discuss some of the tasks of economic geography. What lies ahead is very much a rambling commentary on some of the problems of research in economic geography within the framework of a rather loose organization. Those anticipating the polished essay—the final statement—on content and method in economic geography may be excused, to search other authors in other journals.

In the old McMaster building on Bloor Street in Toronto, geography and political economy have for many years been the principal tenants, and, in some cases, have shared quarters. In fact, no sharp boundary divides their respective domains; the

two merge imperceptibly, especially along the main ground-floor corridor which at one time linked the offices of Griffith Taylor and the late Harold Innis, and, until a year ago, Donald Putnam and Vincent Bladen. This physical proximity only fortuitously reflects the long and significant relationship between the two disciplines which began before a Geography Department was formed at Toronto and is epitomized particularly well in the early works of the late Dean Innis.¹ We, therefore, inherit a deep tradition of research in economic geography at Toronto, a field within which economists such as A. W. Currie and J. H. Dales have, and, we hope, will continue to work, and one which geographers will cultivate with increasing vigour.

As a rule, boundary lines are not sharply drawn around the various disciplines at Toronto,² and I suppose that oft-quoted comment that a department is "largely a budgetary convenience" applies quite well. This is all to the good, since explorations for ideas and principles go on not in the core of one's field, but rather out on the periphery where one is likely to find interesting scholars from other disciplines engaged in similar but not necessarily identical pursuits. It will be understood then that the question of defining limits to fields of enquiry does not concern me, such debates being usually inconclusive.

As a more scholarly economic geography slowly emerged from general commercial geography in Europe and America around the turn of this century, its body of fact became increasingly partitioned into compartments, and contributions to knowledge were made through divergent

topical specialities. The intensification of this sectionalism and resultant division of labour led to innumerable specialized empirical studies. It has also brought good fortune to economic geographers who in recent years have found themselves in demand as consultants on problems ranging from the location of supermarkets to the planning of irrigation agriculture. For the most part these duties have been discharged with distinction and satisfaction.

But have we not lost sight of the larger aim—the seeking out of important interrelationships towards finding the unity of economic geography within definitive economic regions? I do not deny the fact that much remains to be accomplished through intensive investigation within systematic studies; in fact, in my particular field, manufacturing geography, many questions remain unanswered and many problems unsolved. But in most of the systematic work, emphasis has been directed away from the study of the economic structure of area and has been laid rather heavily on commodities (*Produktionsgeographie*).

Quite recently, three German geographers have pointed out this apparent dichotomy in five stimulating, if somewhat repetitious, volumes on general economic geography,³ in which the concept of the economic landscape—an expression of the form and function of the economy—is their basic theme. I am quite aware of the problem of translation of the German "Landschaft" and the different meanings which the Germans themselves have given to it, but in spite of obvious limitations, it is a concept which suggests the basic unity of economic geography.

An economy is mirrored on the land in the form of buildings, communications, field patterns, the spacing of towns, and so on. On the one hand is man at a particular stage of technical advancement, steeped in certain traditions and customs, and on the other is the physical environment (slope, climate, soil, mineral resources, water supply) in which he lives. The impress of culture in its broadest sense on land with respect to the way man makes a living is manifest in the type and arrangement of factories, of routes, and of farm fields, and may be quite properly referred to as an economic landscape. The division of eco-

nomic landscapes into regions is a proper aim, and may be based upon an appraisal of the sum of the various qualities which give any specific area character and substance and set it apart from other areas. As Professor Sauer remarked, "such an economic community has a dominant form or a complex of activity recognisable as to pattern and depending upon a physical body of land."⁴ Witness the striking differences between the sparsely populated Scandinavian Taiga and the intensively developed Western European coal troughs, or within a more limited sphere and having great historical and political significance, the northern and southern shores of Lake Erie.

STATISTICAL MEASUREMENT IN ECONOMIC GEOGRAPHY

At the beginning of all investigations in economic geography is the search for data which will accurately measure phenomena. Our task has been lightened somewhat over the years by the availability of an ever growing volume of statistics which have formed the basis for increasingly precise numerical measurements. To be sure, from the highly industrialized nations the output of statistical materials has reached flood-tide, and it may be that we are falling behind in selection. But data from poor and under-developed nations remain scant and incomplete. Is this in itself not a measure of regional variations in wealth? Surely the collection and publication of statistics, a costly procedure, reflect economic surplus. Furthermore, as Kutznetz notes, "quantitative economic data are found to be most lacking for the kind and types of economic activity that are still closely integrated with non-economic factors within some social or political unit."⁵

In a very real way, the prefix "economic" in economic geography implies the production of goods and services, and quite rightly numerical values of the production of agricultural commodities, manufactured goods, or forestry products are selected, tabulated, correlated, and mapped. As a rule, few statistical problems arise in systematic studies which deal with such worldwide distributions as wheat farming or copper mining. However, attempts to compare various economic activities such as

sugar-beet farming, textile manufacturing, and salt mining *within one region*, and attempts to define statistically a total economic landscape introduce many problems. Furthermore, precise regional comparisons are virtually impossible to make. It becomes clear that one of the major tasks in economic geography is to find means of measurement which will make possible comparisons not only among the various systematic studies but also between regions at least "within some limited framework or in keeping with certain specific and clearly defined goals."⁶

It may be, particularly in North America, that the emphasis should be put upon net values. In studies on location of manufacturing, the concept of "value added" in manufacturing is most useful in particular for regional comparisons and for measuring change through time within a single region.⁷ Such ratios as that of value added to number of employees or value added to total population are also useful and can be quite effectively employed.⁸

Should we not also seek some refinement in the statistics of agricultural production? Production of farm goods should, if possible, be recorded in terms of net value, for "it is just as inaccurate to give an Iowa meat animal farmer credit for producing the ranch animals he bought in Nebraska, as to give a Gary steelmaker credit for iron ore he obtained from Minnesota."⁹

Now it follows that the sum of net values of production for any area should give a measure of total economic production and should allow us to compare more accurately the economic structure of the lower Fraser Valley with that of the Niagara Peninsula, or Prince Edward Island with that of the Manitoba Lowland.

In Canada, the D.B.S. annual *Survey of Production* may prove to be a point of departure.¹⁰ In this report the concept of net value of production or value added is applied to those industries engaged in the production of commodities, and thus includes among primary groups agriculture, forestry, fisheries, trapping, mining, and electric power, and among secondary groups construction and manufacturing. Activities falling within the categories of transportation, communications, trade, finance, and services are excluded. To com-

pute value added, the costs of materials, process supplies, fuel, and purchased electricity are deducted from the total volume of output (excluding indirect taxes) for each industry. The resulting statistics are tabulated by provinces and thus one can compare over-all net production in Saskatchewan with that in Nova Scotia, and the relative importance of each industry.

The possibilities of having these data prepared for smaller areas such as counties or census divisions excite the imagination of the economic geographer, for here would be material to measure quite accurately regional variations in production. In fact, this Association might well set up a small committee to study this problem, to make overtures to representatives of D.B.S. regarding our particular needs, and to prepare a statement regarding the use of statistics in geography in general.

Before I leave the matter of statistical measurement, I must deplore the persistence of an indiscriminate use of statistics in some geographical publications in which all sundry facts and figures (a little bit of everything) are compiled with very little refinement or synthesis. After reading these treatises, one is impressed with the obvious need for more care in the selection and more skill in the manipulation of statistics. Furthermore, great veneration is paid to numerical measurement in regional texts with the danger that it is apt to become a permanent fixture, for, as Oscar Handlin wisely remarks, "the result of most text-book writing is endless imitation."¹¹ Witness the persistence of the twenty-inch rainfall line in some geographies of the United States.

DESCRIPTION

It hardly need be noted that accurate description and measurement proceed *pari passu*, and in some instances are indistinguishable. I find the term "mere" description very disagreeable, for a thorough account of the characteristics and features of an area, or of the distribution of some types of economic activity, can in itself be considered a proper goal. What is needed, however, is some standardization in presentation so that most descriptive accounts can be used in further analytical studies.

Few will deny that cartographic repre-

sentation remains the principal method of communication and the special technique in geographical description. The map, combining the elements of geometry and geography, displays clearly, when used with skill and care, patterns of distribution which otherwise would remain obscure. Data, when shown on maps, create impressions, arouse curiosities, and facilitate analyses. Here indeed is a magnificent form of portrayal to which we have fallen heir. How very well our colleagues on the Pacific coast, in Ottawa, and now in Winnipeg have recognized this rich heritage in the form of their provincial and national atlases.

The task of accurate description of economic landscapes has been greatly facilitated by the increasing availability of new tools such as air-photographs and much new and more detailed statistical data. Of great significance are photographs taken from different elevations above the earth's surface which, when properly arranged stereoscopically, reveal remarkable details of the shape and character of landscapes and, when laid out in mosaic form, striking landscape variations. There is little doubt that in the years ahead an increasing share of every Geography Department's budget will be used to expand its library of air-photos to supplement research and to improve instruction. Statistics on production, consumption, and trade continue to flow out in expanding volume enabling better geographical descriptions to be prepared.

But it must be emphasized that in spite of the convenience of air-photos and statistics, and the precision which they afford, the field remains our principal laboratory in which to observe and record. Disturbing is the fact that some of our most promising colleagues have retired rather prematurely to cloistered quarters in the company of stereoscopes and calculating machines, carefully avoiding the reality of the landscape. I invite them to venture forth once more to tramp across farm fields, snoop into noisy, smoky industrial districts, and wander through mazes of piers and docks. I need not remind you that personal observations are not only indispensable in establishing thorough inventory, but also pro-

foundly influence, and rightly so, analytical procedures.

SOME PROBLEMS OF ANALYSIS IN ECONOMIC GEOGRAPHY

Areal economic distributions do not comprise autonomous phenomena, in the sense that they cannot be accounted for in purely economic terms. This being so, any theory of the so-called space economy can never satisfy all requirements, and has serious limitations in analysis. The nature of an economic region derives from manifold factors making necessary the examination of data both economic and non-economic in studies which have in the past provided valid explanations for the location of such divergent economies as steel manufacturing on the Allegheny Plateau and rice culture in the Irrawaddy Valley. Dependence on the work of other scholars, notably cultural anthropologists and economic historians, has been heavy, but yet the contributions of the geographer have been unique in assembling, interrelating, and analysing the facts which have to do with regional variations.

It is on distribution that the focus is placed, the map performing the function of registrar and guide. Emphasis must be put on process, for only in searching out origins and charting dispersals can the reasons for economic distributions be found. Most landscapes, even in Canada, have changed considerably through time, the present character being understood only by recording changes and tracing growth. In spite of Professor Creighton's comment that geographers, along with political scientists and lawyers, "have . . . tried . . . to abduct Canadian history to a lifetime of servitude in their own particular salt-mines,"¹² I argue very strongly for historical analysis. To illustrate the value of the historical approach, I recommend most highly Professor Pounds' excellent study of the Ruhr.¹³

When the study of geography was more narrowly based and was concerned with the search for causal relationships, environmental determinism held sway—a sweeping hypothesis which guided our predecessors for so many years. Such notables as O. E. Baker, J. Russell Smith, and Griffith

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Taylor studied the relationship of climate to crops and of minerals to manufacturing, and in so doing added greatly to the fund of knowledge. Yet a broadening of the field of enquiry was inevitable, and we withdrew from this rather narrowly enclosed structure of environmentalism. At first the reaction was severe, resulting in the gross exaggeration of human determinants. A spate of studies ranging in scope from intensively microscopic investigations to nation-wide surveys ensued. To be sure, we wandered freely and enquired widely, much to the concern of our more disciplined colleagues both in geography and other fields. Disturbing to some, exciting to others, was the incredible variety of interests seemingly unconnected and best reflected in the programmes of the annual meetings of the Association of American Geographers.

It may be understood then that of late the need for a theoretical structure in economic geography to guide our research and to give us equal status with sociology and economics has been expressed quite forcibly. Some of our colleagues have found inspiration in the works of such economists as Isard and Greenhut who, having introduced the concept of space into general economic theory, have become concerned with ideal locations and a search for a theory of locational equilibrium. Since it has been emphasized that economic distributions cannot be explained entirely by economic factors, I question the desirability of embracing too strongly these confining theories. I enquire whether we cannot debate, in their stead, the possibilities of establishing broad programmes (areal or topical) within which the individual research-worker may wish to explore and which in turn would give him "orderly schemata of possibilities and problems."¹⁴ In Canada I can envisage a programme, among others, of studies on selected regions leading towards an understanding of the economic geography of the country as a whole. In eastern Ontario, for example, the theme of stagnation of economic growth could be selected and vigorously prosecuted, bringing into focus significant changes in agriculture, manufacturing, and related industries within a

regional framework. Such research properly placed upon problems and oriented towards historical changes should produce, in the place of tedious regional compilations, monographs, which would attest to the contribution that geography can make towards understanding some aspects of the Canadian economy.

Within the framework of these suggested "programmes," discussions on the establishment of principles and the discovery of interrelationships could be made. Furthermore, debates on methods and techniques could be waged towards making, as Schumpeter advises economic historians, "theory the servant of research and not its master."¹⁵ There would be some guidance and order to research, yet the maintenance of freedom for scholars to pursue deeply their interests. I remain convinced that our destiny for many years to come is to continue to study empirically the meaningful facts of regional economic geography, and to seek out significant interrelationships which will give full understanding of economic landscapes. Some guidance within "programmes" of enquiry may hasten us to achieve these goals.

It has been noted that theory in an instrumental capacity is useful in analysis in economic geography, and among the recent developments that of the application of statistical methods to the study of interrelationships of different elements is most noteworthy. Of particular importance is the interactance hypothesis which has been applied with numerous modifications and much success to various studies. Professor Spelt and I, in our study of the location of manufacturing in southern Ontario, found its application through the concept of market potential of substantial help in defining the role of the market. It is my understanding that, among other methods, the Poisson formula to analyse areal distributions, factor analysis to solve problems of the selection of regions, and multiple regression to assess regional differences are the most significant.¹⁶

Such statistical techniques have very attractive qualities, but I must remind you in this age of increasing quantification that only certain, and at that a limited number of factors in economic geography can be

quantified, and that serious errors will accrue from the excessive use of theoretical models and abstractions. In becoming obsessed with specific measurements, some social scientists have, as the late Dean Innis remarked, "sacrificed accuracy for precision."¹⁷ Furthermore, Frank Knight's advice to economists that we (often) deal in the averages of estimates and these are not very precise should also be heeded by geographers.¹⁸

Since there remains a very important place for traditional methods of analysis, I suggest a revival, at least for certain purposes, of the study of particular relationships of man and nature, not to demonstrate a general thesis of relationships, but rather to investigate significant aspects of economic geography.¹⁹

To be more specific, the whole question of the influences of natural resources on economic development has been probed very superficially by geographers, and has been left largely in the hands of economic historians. To be sure, the study of the processes of economic growth has long been the well-cultivated field of classical economic historians, but it is true that only a few have tackled the complex problems of the underlying physical basis. Surely such problems form part of the very substance of economic geography, and it is puzzling that our contributions should have been so meagre, especially in the light of the economists' emphasis of human determinants.²⁰ As one economist comments:

... the modern economist's analysis of natural resources tends to be superficial. His uncritical assumption that technical co-efficients of production are variable makes it fatally easy for him to gloss over the physical and technical limitations to production inherent in any particular resource pattern, while his representation of a region's production possibilities by a smooth transformation curve all too often leads to the implication that almost any resource pattern will support almost any production pattern. At times the economic concept of land becomes almost as abstract and nebulous as that of capital.²¹

Am I being too critical when I say that the geographers' attitude is not very much different from that of the economists, because of the tendency to depict, and not always correctly, the obvious? Our text-

books, and perhaps our lectures, are crowded with such vague generalities as "industrialization based on cheap hydro-electric power," and "productive wheat-farming because of chernozem soils." But how do we always know that we are correct? Should we not put these assumptions to some rigorous test? I am not advocating a return to old-fashioned determinism but rather a reappraisal of the themes of our predecessors, which may very well be pursued towards an understanding of economic distributions and the character of economic landscapes.

To be recommended for your examination is the work of Professor Dales on the influence of hydro-electric power on industrialization in central Canada.²² Many other studies on relationships are possible, but perhaps that of climate and economic development is most noteworthy. The theme is as old as geography itself, but, with few exceptions, has attracted very little intensive research.²³ Also of pressing concern is the question of water-supply and economic development, particularly as the population continues to expand in highly complex industrial and urban regions.

POSTSCRIPT

In closing, I wish to make a few rather rambling remarks, not necessarily directly connected with the themes of this essay, about some deeply held convictions. Much has been written recently on the relationship of geography to town and regional planning, and more than a few have argued that thorough geographical study is the basis of planning. There is little doubt that geographers have helped planners in recent years by their analyses of land-man relationships. Several have not only prepared the foundation upon which official plans have been built, but have also influenced the decisions of the planners by forthright prediction. Now it is quite obvious that prediction is not the only purpose of science, and yet as Hartshorne comments, the geographer as a responsible member of society should make his knowledge available to society.²⁴

In North America, in particular, the value of a science, in the popular mind, is very often assessed in terms of the frequency and reliability of prognostication,

and consequently increasing emphasis has been placed upon forecasting changes in the landscape. In recent years the growth of our cities has been so rapid and their influence on the surrounding countryside so striking that some geographers have been led into playing the role of commentators of contemporary change. Such activities are entirely proper, providing the descriptions are thorough and accurate. The risk comes when immediate prediction is attempted without intensive analysis based on historical perspective. Planning has become very fashionable and I fear that geographers faced with increasing requests to participate in detailed local projects will be tempted to place prediction before research. Surely our greatest contribution to the problems of the complex landscape should come in the field of regional planning, in which the concept of the broad region and the theme of changing landscape can be vigorously pursued.

In reflecting on the content of this essay, I note that I have laid great stress upon research in geography. This I have done because I believe that if it is not increased there will be a serious weakening of Canadian geography. The price we have paid for the remarkable expansion in our subject over the last fifteen years, measured in terms of new university departments, increased enrolment, and expanded government services has been high. Some of our most promising scholars, hampered by heavy teaching loads or administrative responsibilities, have had to drop research entirely. The heavy duties of scholarly enquiry have fallen upon a few, of whom, however, nearly all have produced first-rate publications. To quote examples may be invidious, but at that risk I offer for your consideration Professor Kruger's remarkable contribution to an understanding of the problems of land use in the Niagara Peninsula.

One of the factors contributing to a weakening of research in Canada may be the inability of certain geographers to recognize the importance of geography as a fundamental research discipline.²⁵ Furthermore, there is a tendency for some to put the entire emphasis upon teaching, a policy to which certain members of this Association tacitly agree. Progress is then

measured in terms of the enlargement of the enrolment, and the proliferation of courses. The curriculum becomes bloated, as departments attempt to "cover the field," provide all and sundry service courses to sister disciplines, and bow to the increasing demands of Departments of Extension. Teaching loads grow heavier, piles of examination booklets higher, and summers shorter. The final blow is a request to teach summer school, frequently financially difficult to refuse, which removes from the year all but a couple of weeks for rest and refreshment. Quiet contemplation and exciting enquiry become impossible, and even the thought of research fades away.

The problem demands solution. Would it not be desirable for department heads to ask, "How many courses do we really need to maintain a vigorous programme?" I spent enough time at Berkeley to be convinced that there are certain basic systematic courses which must be given, but also to question seriously the desirability of exploring the world via superficial regional exercises. It is true that a few general introductory courses must be taught in any university department, but above this, in the field of higher learning, much discrimination should be exercised. The term "trimming the fat" is one which the Dean of Arts in Toronto used in a recent conversation, and I suggest its application by reducing loads towards releasing precious time for research for university professors.

Furthermore, why do we not, at least until our ranks have grown larger and stronger, import geographers from other countries to staff summer sessions, making available a rather long, unbroken period for our own colleagues to engage in research? Surely our trade deficit would not suffer any further and our students would benefit accordingly. Would it not also be desirable to put a moratorium on the writing of general text-books and pursue more intensively the varied problems in geography? The writing of really great books may have to await the next generation, when the significant regional and topical monographs of this generation have been produced.

The facilities for research in Canada are particularly good. The Geographical

Branch has played an important role in developing and nourishing significant research programmes. In this regard, may I most warmly applaud the support the Branch has given *carte blanche* to individual professors for certain projects. In the last few years, such organizations as the Arctic Institute, the National Research Council, the Social Science Research Council of Canada, and the Canada Council have helped geographers, and it appears that those who wish to venture forth on programmes of research will not necessarily be impeded by lack of funds.

It seems appropriate in summing up to quote Professor Clark that "teaching separated from research becomes sterile and research within the university setting has no meaning apart from teaching."²⁰ The future of this Association among the other learned societies in Canada will indeed be bright if this is understood by our academic branch and success is measured increasingly by contributions to knowledge rather than enlargements of membership.

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prepared material requirements for the manufacturing economy of central Canada, and concludes that the region can supply just over 50 per cent of its material requirements by weight. Without the availability of enormous amounts of hydro-electric power (in coal equivalent 26.9 per cent of the annual material requirements in 1947), he argues that our industrialization would have been very difficult. This brief abstract does little justice to Dales's excellent study; consequently any further comments are limited to two geographical aspects. First, the study would have been greatly strengthened if the region of central Canada had been defined more precisely; certainly northern Ontario and Quebec must be excluded. Second, more attention should have been given to the role of coal in the industrialization of regions such as New England, more remote from Appalachian sources in terms of transportation costs than southern Ontario.

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RÉSUMÉ

L'auteur présente quelques commentaires sur l'importance du paysage économique comme point central des études de géographie économique. Il discute également des problèmes que présentent l'évaluation statistique et la description en géographie économique. Il déplore le fait que les données statistiques sont parfois utilisées imprudemment.

La géographie économique du Canada présente certains problèmes dont la solution exigera des recherches sur une vaste échelle. On devra étudier tout particulièrement les rapports entre les ressources naturelles et le développement économique.

C'est l'avis de l'auteur qu'il y a danger à prêter trop d'importance à la prédiction dans les travaux de géographie économique. Il attire enfin l'attention sur un certain nombre de facteurs susceptibles d'effets désavantageux sur les travaux de recherche en géographie.

THE DISTRIBUTION OF POPULATION AS THE ESSENTIAL GEOGRAPHICAL EXPRESSION

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THE PERSISTENCE of honest confusion among intelligent laymen about the field of geography, and the apparent heterogeneity of its subject matter, underline the continuing need to search for a clear and meaningful formulation of its central theme. Such a theme should possess enough internal coherence to make "boundary" demarcation unnecessary, be distinct from those of other subjects, and be more or less in tune with the standpoints implicit in most current geographical work.

COMMON GROUND IN GEOGRAPHICAL THOUGHT

The expansion and deepening of the study of geography in recent decades has coincided with the emergence of certain common assumptions about its inherent character and objectives.

The first point on which there is general agreement is the essential unity of the field, which has already become almost traditional in North America and western Europe.¹ Only in the Soviet Union, China, and to some extent in eastern Europe do there exist influential schools of thought which deny the validity of a unified view of geography, and they are subject to increasing challenge.²

Belief in a philosophical unity has usually come to be associated with the idea that regional studies form the logical culmination, and this is especially evident in France, Britain, and the United States.³ The strong regional tradition in Russia is reasserting itself, in spite of difficulties of organization, and Marxist theoretical positions are being engaged to buttress both the regional and the unified approach in geography.⁴

The general notion of "space" inevitably permeates geographical thought, but its abstraction as the distinguishing feature of geography has been emphasized most in Germany,⁵ although this is not to imply that regional studies have been neglected.

The closely related but slightly more specific concept of "distribution" has perhaps gained wider implicit acceptance in north-west Europe and North America.⁶

Finally there has recently been a widespread reaffirmation of the old principle of the fundamental relativity of the geographical subject matter to man. Though this has been clearly implied throughout the long history of geography, the need for its recent reaffirmation stems largely from the massive post-Darwinian growth of quasi-independent, self-contained sciences like geomorphology under the geographical umbrella. It is significant that in Germany, where this development has been most pronounced, there seems to have been most reluctance to subscribe to an "anthropocentric" geography.⁷ Geographers in the United States, France, and Britain have been prominent advocates of this position⁸ and in the Soviet Union it has taken the form of a re-examination of the significance of such terms as "environment" and "resources."⁹ It seems likely that the international climate of opinion on this question is more favourable than at any time during the "modern" development of the subject.

THE SEARCH FOR A SPECIFIC THEME

While the majority of geographers would probably subscribe to most, if not all, of these general principles, the quest for a guiding formula entails more dispute. This is a measure of its vital significance for the subject and its practitioners. In Mackinder's words, "As a discipline, a subject requires rough definition for the purposes of organization. It should exhibit a central idea or a consistent chain of argument."¹⁰

SPATIAL PURISM

Of the "central ideas" formulated by geographers, the group which has probably gained the widest currency is that which

concentrates on the abstract concepts of "space" or "area." The major role played by Germans in establishing these concepts has been demonstrated in Hartshorne's book, *The Nature of Geography*,¹¹ and the latter work has undoubtedly given wide dissemination to the phrase "areal differentiation" in the English-speaking world. However many geographers, and others, have found this phrase unsatisfying as an indicator of the essence of the subject¹² and in view of this Hartshorne has also recently doubted its usefulness.¹³ In common with definitions of geography as simply the study of "area"¹⁴ or "space,"¹⁵ it tends to give the appearance of being unspecific and lacking a recognizable coherence. To restore the missing dynamism Ullman suggests "spatial interaction."¹⁶ However, although this is a salutary corrective to a narrowly morphological approach to geography, one is left with the impression that something is still missing. Apart from the special (if not very serious) connotation of the word "space" in the lay mind today, the crucial question which appends itself inevitably to concepts like "areal differentiation," "spatial interaction," and "distributions"¹⁷ is—"of what?" Hettner advised the selection of only those phenomena whose variations are interrelated with those of other phenomena over the face of the earth,¹⁸ but since almost everything on the earth's surface is functionally related in some way to something else, this still fails to provide a very helpful focus. It is often paralleled today by defining geography in terms of such phrases as the association of "things" on the earth's surface.¹⁹ These broad and rather diffuse themes have been amplified recently by Ackerman as follows: "... illuminating co-variant relations among earth features ... the differentiation of the content of space on the earth's surface and the analysis of space relations within the same universe. . . ."²⁰

While few geographers would deny that the general concepts of "space" or "distribution" are vital to the subject's survival, it does appear that the category of definitions in the previous paragraph has in common an unfocused quality which tends to puzzle intelligent laymen while providing little guidance for working geographers.

Slightly closer to the common under-

standing is the idea of geography as an investigation of "the significance of likenesses and differences among places on the face of the earth."²¹ However, although "place" has a more human ring in popular parlance than "area," the distinction is so subjective that one is still left without any clear guidance about what may constitute "significance" in this context.

THE INTRODUCTION OF MAN

The idea of human relativity in geography has, from Strabo onwards, found recognition in such characterizations of the field as "the earth as the home of man" or the somewhat broader and subtler "the earth as the world of man" as recently restated by Hartshorne.²² Unquestionably such a rider, if fully accepted, can bring the horizon of the subject into sharper focus, although it has sometimes seemed to be a way of paying lip-service to an old principle while retaining *carte blanche* to study the earth from virtually any angle.

All the sciences are inevitably guided by a basic human interest in the phenomena they are studying, but as geography has come to be constituted in a quite special way, with man himself as an integral part of the whole study alongside heterogeneous natural phenomena, the precise nature of their relationship, though elusive, should, if possible, be pinned down.

The concept of "environment," traditionally used but not always fully understood by geographers, still seems a satisfactory way of expressing this relationship, but it does mean that the natural phenomena with which geography is concerned are meaningful (in geography) *only* in terms of complete relativity to man. They are, in fact, hardly separable, for, as Mackinder put it, "man is a part of his own environment, as cheese-mites are a part of the cheese."²³

MAN TO THE CENTRE OF THE STAGE

Although the use of the term "environment" implies the philosophical primacy of man in geography as it has in fact crystallized into an organized body of knowledge, most statements of the field concentrate upon earth rather than man, no doubt in deference to the derivation of the word. However this emphasis has been explicitly reversed in several essays, of which one of

the earliest and most influential was Barrows's presidential address entitled "Geography as Human Ecology."²⁴ Not that there was anything very revolutionary then or now in the statement that "geography will aim to make clear the relationships existing between natural environments and the distribution and activities of man . . . adjustment to environment rather than environmental influence."²⁵ The methodological novelty consisted in the way the horse was apparently being brought out from behind the cart. A generation earlier Hettner had implicitly adopted a somewhat similar posture when he said, "A sure scientific knowledge of the actually existing causal relationships is only possible if one proceeds from the human facts, classifies these, and pursues them to their geographical roots,"²⁶ though in his general geographical philosophy he differed significantly from Barrows.

The view of geography as human ecology has been echoed in many countries,²⁷ and Barrows's influence on the course of geographical method may well have been inadequately recognized. However, the term "human ecology" is now unacceptable, both because of its biological associations and because it has been adopted for a quite widely cultivated branch of sociology dealing with purely human relations within specific communities.²⁸ Also, Barrows's bodily exclusion of such fields as geomorphology and climatology from geography proper, if taken literally, would be a surgical operation fatal to the subject. Paradoxically, though, he had insisted on thorough and detailed grounding in these and similar fields for geographers,²⁹ and it could in fact be objected that his human ecology paid too exclusive attention to "adjustment" to the natural environment. However, this stated emphasis was no more to be associated with crude "environmentalism" than was Mackinder's view of geography as "a philosophy of Man's environment, Man himself—his body—being an element in that environment."³⁰

In spite of the oft-quoted remark of Vidal de la Blache that geography is "the study of places, not men,"³¹ it is in France that the idea of geography as essentially a social science has been most thoroughly advocated in recent years. For instance,

Cholley, in his influential *Guide to the Student of Geography*, concludes that "the geographical point of view is essentially a kind of philosophy of man considered as the principal inhabitant of the earth."³² Le Lannou, in an illuminating and profound study, conceives of geography as the study of "man the inhabitant (*L'homme-habitant*)"³³ and, like Barrows, draws the logical conclusion that "human geography" is simply geography ("*géographie tout court*"), but unlike Barrows finds a necessary and important place *within* the subject for systematic studies of the various aspects of the natural environment.

If there is tacit agreement among geographers that the spatial context and human significance are the touchstones of things geographical, can they not be essentially fused in the superficially simple, yet profoundly complicated question—"Why are people where they are?" Several geographers in different countries have come close to identifying their subject with this central question,³⁴ and it seems desirable to examine the suitability of such a central role for it in the organization of our subject.

THE DISTRIBUTION OF POPULATION

The thesis of this paper is that, in essence, geography is concerned with the problem of the uneven distribution of population over the earth. However two points about this expression should be kept in mind. First, the full significance of "distribution" as a controlling point of view has to be kept to the fore if the "ge" is not to slip out of geography. Second, "population" in this context is essentially synonymous with "man" and not used in the rather restricted sense adopted by demographers and statisticians. The word is used because it does seem to suggest more precisely than "man" those social groupings or patterns on the earth (compare the transitive verb "to populate") upon which the geographer concentrates his attention. A reliable population map is the primary document—the point of departure—for geographical analysis.

This formula provides general guidance in the difficult matter of selection of significant material for inclusion in geographical studies. Hartshorne has said that "the prob-

lem of selection is of greatest importance in respect to human phenomena because of the unlimited number of areal variations that can be observed,"³⁵ and cited Plewe's questions about the relevance of regional variations in cathedral architecture, contents of art galleries, and so on. Whereas general clauses like "significance to man" or "interrelated phenomena" are not very helpful in practice, the more specific criterion of relevance or possible relevance to the task of understanding the *distribution* of population does sharpen the focus without narrowing the range of vision.

This idea acts as a master-thread, capable of weaving into a coherent pattern the otherwise disparate strands of the subject and expressing its philosophical unity, particularly in the context of regional studies. Such a framework has in fact been implicit in some of the most successful and rounded geographical essays, and in one, which remains without peer as a regional geography on the continental scale, it has been essentially spelled out. In the introduction to *Latin America*, James stated that "this book deals with the arrangement of people on the land, and since a geographer is interested primarily in the significance of the factor of location in human affairs, he must inevitably stress the distinctions, the contrasts, the elements which make one place, and the people in it, different from another place and from other people . . . these themes have to do with the pattern of population and the relation of this pattern to the various factors which have combined to produce it."³⁶

IDEAS ABOUT PLACE

It is now widely accepted that the physical character of the earth can only be assessed meaningfully in terms of the ideas and valuations which particular groups of people have about it at particular periods of time.³⁷ Thus *ideas about place* emerge as closer to the heart of the matter than an "objective" study of place as such. The most conclusive and telling geographical commentary on a place is made when people make it their home and gain their living from it or at least do not move away, so that the cumulative geographical values of any area may be said to be reflected in the distribution of

population. The obvious fact that the mobility of people in many countries is heavily restricted by political, economic, or social forces is one which would have to be reckoned with in any geographical study of those areas and is itself a geographical fact of the first magnitude. The term "geographical factor," as used by historians, economists, and others as a synonym for "the physical factor," is still tacitly embodied in the mode of organization and the criteria for selection of material employed by some geographers, although it has been flatly disowned by the bulk of the profession. This habit of thought derives from the days when the geographer's chief object of study was the physical earth, and human geography a sort of postscript which was to be philosophically fitted into, as flowing from, the classifications of this physical "basis."

The *idea*, which inevitably interposes itself between man and environment, has somehow to be embodied more prominently in statements of the geographical field, if such remnants of "environmentalist" attitudes are to be exorcised. We need to take up an explicit philosophical position which expresses and gives support to the trends in our practice, and it would seem that this involves uprooting the former philosophical subordination of "man" to "earth."

The emphasis upon "earth" as the ultimate end of study in geography is founded on tradition and buttressed by the literal derivation of the name of our field. Although we cannot afford to be permanently bound by the habits of mind of our predecessors, neither can we afford to overturn them lightly. A passage from Hartshorne's recent book highlights this question of emphasis. After quoting Cholley's statement that "the geographical conception is in the last analysis a kind of philosophy of man considered as the principal inhabitant of the planet," he comments, "The expression, however, is easily misunderstood; specifically its meaning for me is greatly changed by the form in which Le Lannou puts it: 'geography is the knowledge of man considered as an inhabitant of the planet'. I should wish to restate it: geography is man's study of the earth as the planet of which he is the principal inhabitant."³⁸

Although he does not discuss the reasons for his definite preference, it is undoubtedly the one which would instinctively occur to a great many geographers.

Yet it is contended here that to focus essentially upon the problem of the distribution of population is to bring the study of man "down to earth" rather more positively than is implied in the French definitions, while keeping "ideas" (about place) more firmly enthroned than in Hartshorne's statement. This viewpoint necessarily permeates the stuff of regional geography in any case. It would obviously be fruitless to try to account for the existence of such cities as Washington, Los Angeles, or Leningrad without giving prominence to the ideas, by no means always rational ones,³⁹ which have brought them into being and perpetuated them. Several geographers have recently pointed out the necessity of examining much more closely the workings of men's minds in relation to their surroundings⁴⁰ (and also in their relations with each other). As Sauer has emphasized, the most difficult task in geography is "to evaluate site and situation, from the point of view of the people and periods concerned."⁴¹ It requires in good measure the imaginative insight of the novelist or historian combined with the "eye for country" of the field man. In particular the quest for the immensely complicated truth about "situation," nowadays necessarily in a global context, does heighten the whole geographical perspective. If explored through the populating process, with changing ideas about place as a focus, not only environmentalism but also a monolithic economic determinism are effectively prevented from taking over. Renewed scope and purpose is given to the study of processes, interactions, and functions, correcting a certain over-emphasis upon morphology and tangible objects which has manifested itself in the various branches of the subject.⁴² The artificial man-nature dichotomy, which has bedevilled much geographical work and has both encouraged environmentalism and split geographers into two camps, tends to vanish. Further, the space-time dichotomy between geography and history, expounded by Hettner, for instance,⁴³ has little meaning if the theme of historical geography is

conceived as the study of the changing distribution and differential growth of population over the land through time. Population is a dynamic phenomenon and can hardly be considered otherwise, but restriction of the study to distributional aspects makes the geographical character clear.

THE NATURAL ENVIRONMENT

What has been called "Statistical Determinism" must be as rigorously eschewed as physical or economic determinism. Although official population statistics provide, of course, highly valuable raw material for geography, they are not indispensable. The distribution of population is qualitative as much as quantitative, and obviously cannot begin to be properly interpreted without a thorough knowledge of the natural environment. This vital subdivision of the subject has so far had a retarded growth, except perhaps in the Soviet Union,⁴⁴ through being treated either in terms of its own evolutionary history, or as something quasi-static with a somewhat mystical control over man, or both. In particular, the modern rise of a geomorphology with self-contained methods and philosophy has often appeared as a cuckoo capable of disrupting the coherence of the geographical nest in which it was deposited. This circumstance has led to an inflated view of the importance of geomorphology in geography (particularly in comparison with other branches of natural geography), even among some eminent "human" geographers, and to logical confusion between geomorphology and historical geography in relation to geography as a whole. Thus for Darby, "the foundations of geographical study lie in geomorphology and in historical geography . . . the basic elements of our discipline,"⁴⁵ while for Spate, "the genetical approach . . . is the vindication of its [geomorphology's] inclusion *en bloc* within the ambit of geography."⁴⁶ Wooldridge and Linton go further, averring that "features in human distribution or economy which are not, in any evident sense, a reflex of physical conditions . . . are intrinsically 'sociological' rather than 'geographical' in the ordinary sense of the term . . . only the closest study of 'physique' can equip us to decide which of its features are

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or were geographical determinants. Any such close comprehension of the terrain can be obtained in one way only, by tracing its evolution.⁴⁷

The result of this emphasis has been the extreme paucity of information, even for regions where geomorphologists have been active, about what is actually going on, in qualitative and quantitative terms, in the living natural environment. The concept of geography as essentially concerned with human distributions provides the required stimulus and guidance for the sorely needed enrichment of an integrated study of the natural environments with which men have to reckon, in terms of interacting processes and precise characteristics. The collapse of a sweeping environmentalism has made the rejuvenation of detailed and thorough environmental studies all the more necessary to the validity and survival of geographical work as a whole. The genetic method in "natural" geography should be retained insofar as this makes for a more profound understanding of actual functioning conditions, but not otherwise.⁴⁸ The only meaningful common denominator of the otherwise distinct branches of natural (or physical) geography is the link with man as part of his environment, so that it necessarily occupies a logically subordinate, though vital role in the subject, a role that is expressed through relativity to the distribution of population. Even in uninhabited areas, the task of illuminating the peculiarly negative qualities of environment, future possibilities, and effects upon neighbouring inhabited lands provide many challenges for natural geographical work.

A SIMPLER LANGUAGE

By focusing on the central problem of the distribution of population, one can also avoid the necessity for using and defining much of what might be called geographical jargon. For instance, abstract or general terms like "areal differentiation" or "space relations," and ambiguous words like "Landschaft" or "the geographical envelope," become redundant. It is very desirable that geography should not part company with history, its nearest neighbour philosophically, by accumulating a private technical vocabulary in the manner of

economics, sociology, or geology. Even the term "geographical factor," which properly means nothing more or less than the factor of location or distribution, should in practice be as rarely employed by geographers as "the historical factor" is by historians.

A SPECIAL FIELD?

It may be objected that the approach outlined in this paper is simply that of one topical subdivision of geography, called "population geography," whose case has recently been presented by Trewartha.⁴⁹ But it is difficult to see how this "branch," whose objective is, according to James, "to define and bring forth the significance of differences from place to place in the number and kind of human inhabitants,"⁵⁰ could achieve this end at all adequately without becoming the whole geographical tree. Thorough interpretation of the pattern of population automatically engages and integrates the whole realm of geographical knowledge. The lack of a wide acceptance of "population geography" as a "special field" and of references to "population," as distinct from "man," in the writings of geographers, may indicate that it is neither necessary nor practicable. There seems no particular reason for geographers to adopt the statistician's restricted use of population rather than the broader connotation of man in society. Can there really be any meaningful distinction for geographers between "the distribution of man" and "the distribution of population" or between "human geography" and "population geography"? Competence in the handling of statistics is nowadays basic to serious work in geography as a whole and all of its subdivisions, and cannot be considered a skill peculiar to certain topical specialists.⁵¹ Perhaps the strengthening of an "anthropocentric" coherence in geography, for which Trewartha forcefully pleads, might be better achieved by infusing more awareness of population distribution as a controlling viewpoint in the already traditional systematic fields of the subject and above all in regional studies. The distribution of population is best regarded as a summation, or the current end-product of the geographical process, which is not to

suggest, of course, that it is simply a product of the operation of other factors, because previous patterns of population exert a strong cumulative influence on the character of subsequent changes.

A FRAMEWORK FOR PRACTICAL AFFAIRS

No subject should be judged primarily on its direct and tangible usefulness; the main value of geography lies in its contribution to the building of broad and humane educational foundations. Nevertheless the geographical approach and method is being increasingly applied to planning operations in both communist and non-communist states, at both local and national levels. The distribution of population, besides expressing the prevailing geographical conditions and because of this, is a convenient and revealing starting-point for attempting a planned organization of a community or region.⁵² This central theme also identifies geography in the lay mind with such perennially crucial and talked-about topics as the earth's habitability, "overpopulation," the balance of population and resources, and so on, into which the sobering influence of the informed geographical world-view can profitably be injected.

A SPINE FOR REGIONAL GEOGRAPHY

While regional geography is frequently acknowledged as the crowning chapter of the subject, the low quality and interest value of actual regional studies—"such wooden things," as Sauer called them⁵³—is just as frequently commented upon. In part this is due to uninspired style, but often also to the fact that a cohesive spark of life is never breathed into the dry bones of the systematic specialisms which have been assiduously collected. Such symptoms have led some geographers to prescribe polishing up the bones by elevating systematic studies to a much higher pedestal,⁵⁴ just as medical practitioners seem to concentrate more and more on small segments of the body and less and less on the whole man. There is a danger for geography, which is nothing if not an entity, in such fragmentation and specialization and the lure of a "scientific" aura with a spawning technical vocabulary. Who can possibly pin a "systematic specialism" label (and make it stick) on the greatest of our geo-

graphical predecessors, like Mackinder, Hettner, Vidal de la Blache, or Anuchin (to go no further back), or on many of our most eminent contemporaries? Systematic studies do, of course, play a vitally important part in the training of geographers, and their findings must be tested and re-tested by research, but the survival of geography requires that they remain logically subordinate and subservient to the regional synthesis.⁵⁵

The distribution of population is the key to the whole geographical personality of a region and can endow regional geography with life, meaning, and interest.

A DISTINCTIVE FIELD

Finally it is submitted that the distribution of population presents as the central geographical theme a coherent problem which is clearly distinct from that which other disciplines have evolved and are marking out for themselves. While the economist is concerned with the location of economic activities and the demographer with movements of population, their interest in these phenomena is marginal, whereas for the geographer it is all-important and involves the viewpoint on which his training has been focused. While all are concerned with man, distribution is the vital concept distinguishing geography from other social sciences and from history, and its interpretation necessitates systematic study of the earth as the human home and provider, and of ideas about its worth. Similarly although such disciplines as geology, meteorology, and botany are concerned to study systematically particular classes of phenomena on or near the earth's surface, geography culls from each of them the subject matter it needs to provide an integrated picture of the natural background of man. In other words geography is clearly marked off from history and the social sciences by its distributional context and from the natural and biological sciences by its human standpoint. Its philosophical position is unique and the method of cultivation of its unified field very much its own.

CONCLUSION

The contention of this paper has been that the distribution of population is the essential geographical expression, thorough

interpretation of which can weave the many strands of geographical knowledge into a coherent and intelligible pattern. This idea is presented, not as a straitjacket for our subject, but to draw attention to what appears to be a guiding star, on which we may find it helpful to take bearings when setting the course of our professional work.

The preamble to the main argument has been concerned to show that this idea has been implicit in the development of the subject for a long time and that it is in line with recent trends in geographical thought in most countries, in which the subject is represented as essentially man-centred, yet bound to the spatial plane of the earth's surface and possessing an elusive but none the less real unity which finds most apt expression in regional studies.

The most important general function performed by the concept of the distribution of population as the essential geographical expression is that of a philosophical keystone for building a securely unified subject. The twin notions of "distribution" as a controlling point of view and of social man on the earth coalesce at the heart of geography and in this expression. The bringing of man (population) to the fore as *the* tangible object of our study, with distribution as *the* abstract context, results from the widespread conviction that the meaning of the natural environment is relative to particular human values and ideas at particular periods. Thus *ideas about place* come closer to the heart of our subject matter than place itself, and find their cumulative reflection in the chosen distribution of population in any region.

This expression has special application as the point of departure for regional geography, the status of which, as the ultimate chapter of the subject, needs to be vigorously reasserted, if it is not to be outdistanced and sidestepped by the systematic specialisms which should subserve it. A regional geography so focused gives full play to the study of historical processes as they have operated to produce the current distribution of population and gives no encouragement to environmentalist ways of thought. On the other hand, although in this system the terms "human geography" and "population geography"

become synonymous with "geography" and therefore redundant, renewed scope and purpose is given to the integrated study of processes in the living natural environment, vital topics often hitherto overlooked by the self-contained, evolutionary approach which has characterized much work in "physical geography." The unduly morphological approach to both natural and cultural phenomena is replaced by one which is more dynamic and functional.

Geography is made more attractive and intelligible to laymen, partly through being identified with the perennially crucial problem of the earth's habitability, rather than with an abstract concept like space or place, and partly through rendering redundant a number of technical terms not within the common understanding. At the same time no lowering of the standards of scholarship or shrinking of the recognized geographical field is involved, while a useful philosophical framework for practising geographers is offered.

The uniqueness of the field of geography is not only retained, but heightened. The coherent and momentous problem presented by the uneven distribution of population over the earth expresses the essence of our field and calls into orderly play the broad realm of geographical knowledge.

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RÉSUMÉ

Le thème principal de cet article est que la répartition de la population constitue le fait essentiel en géographie et que l'interprétation de ce fait peut permettre d'effectuer le tissage des fils multiples de la connaissance géographique en une trame cohérente et intelligible. Ce n'est pas l'intention de l'auteur d'offrir un moule rigide, mais plutôt une idée-directrice qui puisse servir de point d'orientation aux travaux des géographes.

Ce concept est implicitement contenu depuis longtemps dans l'histoire de la pensée géographique et on le retrouve à la base de l'orientation contemporaine de la géographie en plusieurs pays. Cette orientation est essentiellement anthropocentrique bien que le sujet demeure étroitement lié au plan spatial de la surface terrestre. Son unité, sinon toujours patente, n'en est pas moins réelle et s'exprime le plus manifestement dans les études régionales.

Cette vue de la répartition de la population comme idée maîtresse de la géographie est, philosophiquement parlant, la clef de voûte qui donne à l'édifice son unité. La notion de distribution comme facteur de contrôle et celle de l'homme comme être sociable, habitant de la terre, se coalisent au cœur même de la géographie et dans la définition de ce terme. Puisque l'on accepte généralement que le milieu naturel ne prend un sens vraiment géographique que lorsqu'on le considère en rapport avec des valeurs et des concepts humains particuliers et à des périodes données de l'histoire, les faits de l'homme (faits de population) constituent donc l'objet tangible de notre discipline tandis que les faits de répartition en sont le contexte abstrait. Les idées sur les lieux touchent de plus près l'objet de notre étude que les lieux seuls et trouvent leur expression cumulative dans la répartition de la population dans diverses régions.

Cette idée s'applique tout particulièrement à la géographie régionale dont elle devrait constituer le point de départ. Elle servirait ainsi à réaffirmer la position de la géographie régionale, qui est bien le terme et le produit

ultime des recherches géographiques. Autrement, la géographie régionale pourrait être perdue de vue ou même ignorée dans la masse de matériaux que nous livrent les travaux systématiques et spécialisés, alors que ces derniers devraient plutôt être subordonnés aux fins des études régionales. Ainsi orientée, la géographie régionale donne pleine valeur aux facteurs historiques qui ont influé sur la distribution actuelle de la population et permet d'éviter les dangers d'une conception trop déterministe. De plus, bien que, suivant cette vue, les termes "géographie humaine" et "géographie de la population" deviennent synonymes de "géographie" et par conséquent redondants, des horizons nouveaux et élargis sont ainsi ouverts à l'étude des modes de développement du milieu naturel vivant. Il s'agit là d'un domaine de recherche qui est d'une importance vitale et qui a été négligé jusqu'ici dans les travaux de "géographie physique", où l'on prend une vue compartimentée et évolutionniste de la réalité. Ainsi, au lieu de placer un accent trop prononcé sur les aspects purement morphologiques des phénomènes naturels et humains, on pourrait étudier ces derniers par une méthode plus dynamique et fonctionnelle.

Le caractère unique du domaine de la géographie est par là non seulement préservé mais accentué. Le problème de la répartition inégale de la population à la surface du globe exprime l'essence même de notre champ de recherche et son étude engage en un jeu ordonné toutes les ressources de la connaissance géographique.

A PRELIMINARY ACCOUNT OF LATE "WISCONSIN" GLACIATION IN MELVILLE PENINSULA, N.W.T.*

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MELVILLE PENINSULA in the eastern Canadian Arctic is an upwarped and easterly tilted massif of Precambrian crystalline rocks flanked on the northeast and the southwest by lowlands of Palaeozoic sediments (Figure 1). Ordovician limestone and dolomite underlies the country north of Parry Bay, and similar rocks, as yet undated, occur on Wales Island, and on a narrow strip of the adjacent west coast of the peninsula. The peninsula reaches its

highest elevations in the west, where it rises to heights of over 1,500 feet along the stream divide. From there, the surface slopes gently to the east.

This account of late "Wisconsin" glaciation covers one aspect of a study

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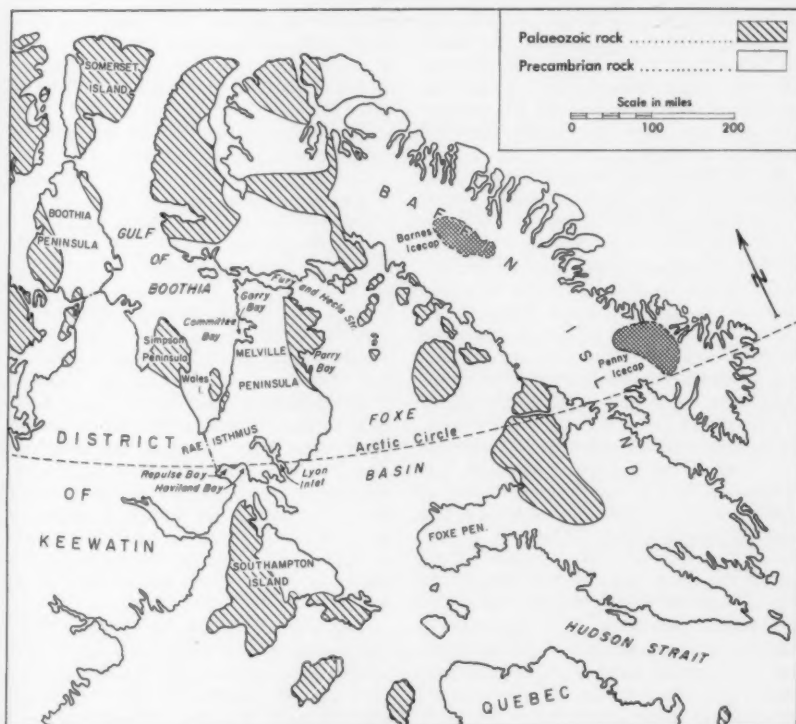


FIG. 1: Location map of the eastern Canadian Arctic.

of the physiography of the peninsula carried out during the summer field seasons from 1957 to 1959. It is intended only as a preliminary discussion in which a hypothesis is put forward in order to explain certain glacial terrain features examined in an area which is as large as the province of Nova Scotia. Additional work must be done before the sequence of glacial events can be fully described.

GLACIATION

Glaciation in the eastern Arctic during the "Wisconsin" presumably developed as Flint has suggested.² Valley glaciers, descending the western slope of the mountain chain through Baffin Island, coalesced to form a piedmont apron of ice. This apron thickened and expanded into Foxe Basin, at that time possibly a broad, unsubmerged plain. With continued accretion, the ice moved south and southwest to join the expanding continental ice mass over Hudson Bay and northern Quebec. The Laurentide Ice Sheet thus formed eventually covered all of eastern Canada and merged with the ice sheet advancing eastward from the Cordillera.

R. S. Taylor has indicated a possible sequence of main glacial dispersal zones in the eastern Arctic during the "Wisconsin."³ Following the development of the piedmont ice apron along the western base of the Baffin Highlands, a zone of major dispersal formed in Foxe Basin. With continued continental glaciation the main dispersal zone shifted to northern Hudson Bay where it remained, with only minor movements, until late in the "Wisconsin." When deglaciation was well under way, local centres of ice dispersion developed. These lay on the Keewatin mainland west of Hudson Bay, in central Quebec east of Hudson Bay, and in the area of Foxe Basin-Southern Baffin Island.⁴ It is suggested that it was a late advance of the ice in the latter area which formed the glacial features which are present today in Melville Peninsula. No evidence of earlier ice movements has yet been identified in the peninsula. A study of numerous and varied glacial features in the field and thorough examination of many hundreds of aerial photographs have indicated the important directions of these latest ice

movements. The distribution of many of these features has been plotted on the accompanying maps.

DRUMLINOIDS

True drumlins are extremely rare in Melville Peninsula. Drumlinoid ridges and fluted till hills occur commonly, however, and provide the best evidence of the direction of the latest ice movement. With the exception of a small number of these features below the limit of marine submergence on the northeastern lowland, they are almost entirely restricted to the crystalline upland (Figure 2). Such features are particularly prevalent in the northern portion of the peninsula between Franklin Bay and Mogg Bay, and in the southwest from Rae Isthmus northward to latitude 68°N. In both areas, the most striking aspect of the drumlinoids is their pronounced parallelism and their irregular width and height (Figure 3). The drift of which they are composed is, in general, quite thin, seldom exceeding 20 or 30 feet in depth.

The arrangement of the drumlinoids reveals two distinct patterns:

1. Throughout the peninsula, exclusive of Rae Isthmus, the features have a general orientation varying through an arc of only 25 degrees. North of 68°N. latitude their bearings vary roughly from N.65°W. to N.75°W. Between Rae Isthmus and 68°N. latitude they have bearings which vary from N.50°W. to N.70°W. This orientation is similar to the bearings of grooves and striations observed on the bedrock of the peninsula. Such features are, however, neither numerous nor well preserved. They occur most commonly on the upland areas bordering the west coast where they are found to vary through a slightly wider directional range. Of striations measured in 38 different areas, all but 6 fell within the northwest-southeast quadrant and all but 9 in the 50° arc from N.40°W. to N.90°W.

2. A second area of drumlinoids, differing significantly in orientation from those to the north, occurs on Rae Isthmus. Here they are particularly prominent between Repulse Bay and the southern end of Committee Bay where they have an orientation varying from N.25°W. to N.30°W.

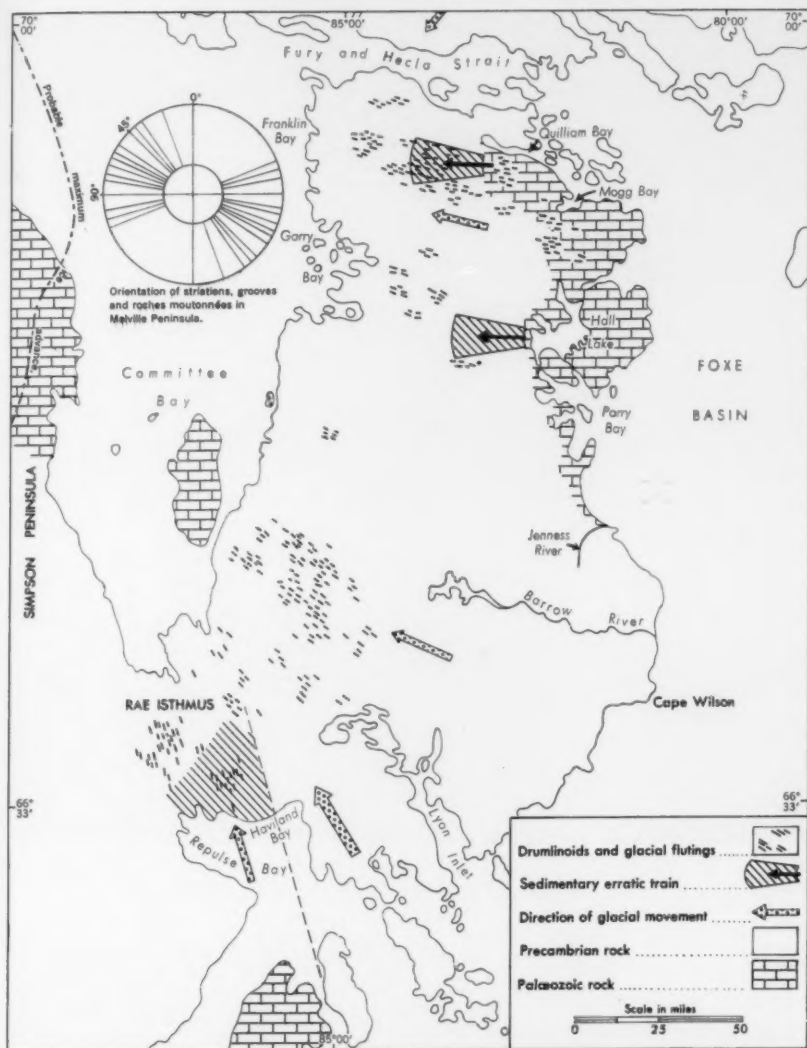


FIG. 2: Map of drumlinoids and related features in Melville Peninsula.

The preceding data simply indicate the general orientation of the features. They do not indicate which way the ice which formed them did, in fact, move. Many of the fluted till hills examined in the northern portion of the peninsula, how-

ever, exhibit eastern stoss slopes and western lee ends. Many more, in plan view, have obviously westerly tapering shapes. These factors—often found in association with nearby crag-and-tail features streaming to the west, and with roches mouton-

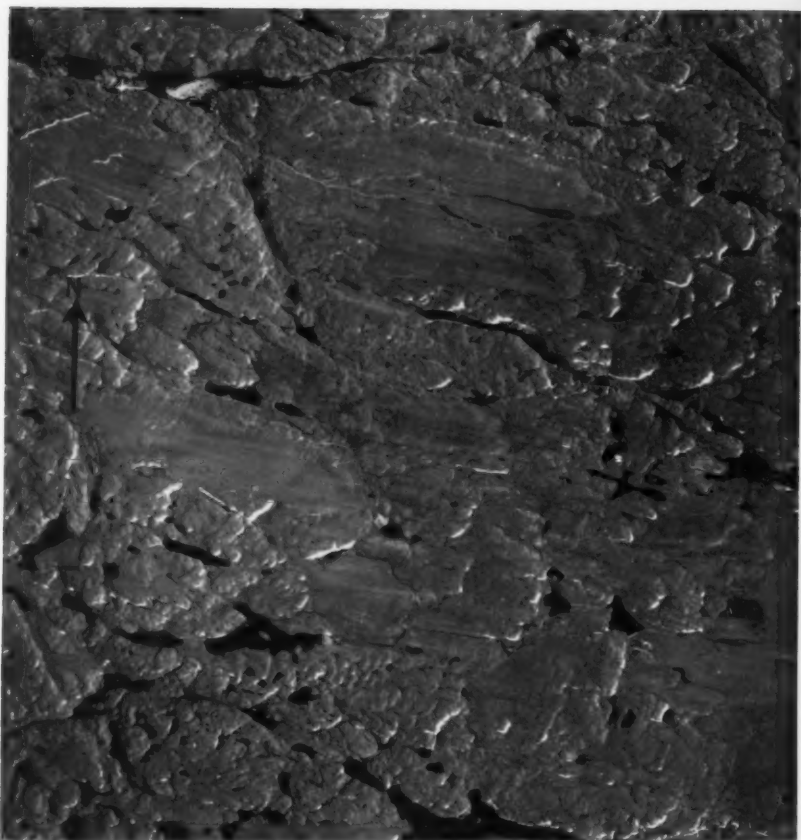


FIG. 3: Drumlinoid ridges of thin glacial drift trending in a west-northwest direction across the Precambrian surface southeast of Wales Island. (R.C.A.F. Photo A15352-54.)



FIG. 4: Roche moutonnée a few miles north of Sarcpa Lake. Note the classic ice-moulded form and the prominent plucked face to the right indicating glacial movement from east to west (left to right across the photograph). (Ground Photo Panorama V.W.S.-1957-11-1, 2, 3.)

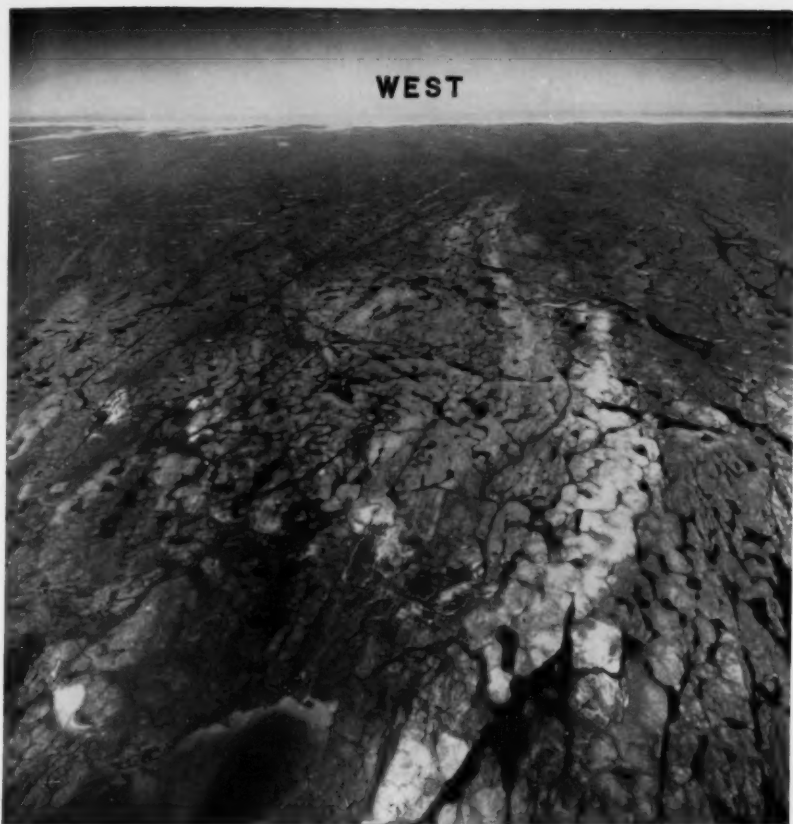


FIG. 5: In this oblique aerial view westward over the Precambrian upland, the light-toned region in the centre of the photograph is an area of glacial drift containing a large amount of material of sedimentary origin. The light-toned area gradually disappears to the west in the background of the photograph. The contact between the Precambrian crystalline rock and Palaeozoic sedimentary rock is just off the lower edge of the photograph. (R.C.A.F. Photo T335L-57.)

nées having a classic streamlined form, and their glacially plucked lee slopes oriented toward the west (Figure 4)—certainly suggest that the ice movement was in that direction. Well-developed roches moutonnées of this type were, for example, examined in the area south of the drumlinoid region between Mogg Bay and Franklin Bay. Moreover, numerous glacially smoothed rock hillocks having clearly apparent west-facing plucked faces are arranged *en échelon* with their long axes in

west-northwest to east-southeast parallel alignment.

It was not possible to examine the drumlinoid features in the southwestern portion of the peninsula in as much detail as those in the north. An examination of aerial photographs suggests, however, that they are generally similar. Their physical characteristics lead to the conclusion that they too were formed by ice moving from east-southeast to west-northwest. Similarly, the shape and profile of drumlinoids and

associated features on Rae Isthmus confirm a direction of movement from southeast to northwest.

SEDIMENTARY BOULDER STREAMS

An additional piece of important evidence suggesting a west-northwesterly direction of ice movement in at least the northern portion of the peninsula is the presence of Palaeozoic boulder streams and swaths of limestone-charged ground moraine extending westwards across the Precambrian upland from the geological contact between the sedimentary and crystalline rocks. The sedimentary material in these areas shows clearly both on the ground and on aerial photographs (Figures 5 & 6). One boulder stream extends west



FIG. 6: Ground moraine west of Hall Lake, containing a high proportion of material of sedimentary origin. Note the extremely light tone of the surface. (Ground Photo V.W.S.-1958-20-7.)

from Hall Lake and another from the vicinity of Quilliam Bay (Figure 2). Traverses made through both areas show that sedimentary material is an important constituent of the till near the eastern ends of the areas and decreases considerably in amount towards the west. Very little sedimentary material is found in the central and western portions of the peninsula. It seems reasonable to conclude that this sedimentary material originated on the eastern Palaeozoic lowland and was transported to its present position by glacial ice movement generally from east to west.

On Rae Isthmus the distribution of sedimentary erratics is also significant. Limestone and dolomite boulders are rare as a constituent of the thin till on the north

side of the isthmus. They are found commonly only on the south side. It seems likely, therefore, that till containing this material originated on the nearby limestone areas of Southampton Island to the southeast rather than on the sedimentary lowlands of Wales Island or Simpson Peninsula. It was carried to Rae Isthmus by ice moving northwest from the former area.

Another curious feature of the distribution of sedimentary material on the isthmus supports the view that ice moved across the isthmus most recently in a northwesterly direction. West of a line extending inland from the west shore of Haviland Bay (Figure 2), sedimentary erratics are numerous in the till, both below and above the marine limit. East of that line they are completely absent above the marine limit and are very uncommon below. Those which do occur may have been rafted into the area on ice blocks when the sea stood higher than it now does. This distribution of the erratics suggests that the limestone-free crystalline till east of the line originated on the eastern Precambrian upland of Southampton Island, while the limestone-charged drift to the west of the line originated on the western Palaeozoic sedimentary area of the island.

In summary, the most recent ice movement was roughly westward and north-westward as a broad lobe covering all of Melville Peninsula.

DEGLACIATION

When final ablation began, the ice appears to have melted primarily by down-wasting. Thinning of the ice, which had never been excessively thick, soon reduced its activity and most melting apparently took place under stagnant conditions. The features described below were formed during the deglaciation of the peninsula; their significance is discussed in the concluding section of this paper.

KAME MORAINES

A prominent north-south trending ridge of gravel and boulders can be traced over a distance of 70 miles in the western portion of the peninsula south of Garry Bay

70° 00'

PENINSULA

SIMPSON

66° 33'

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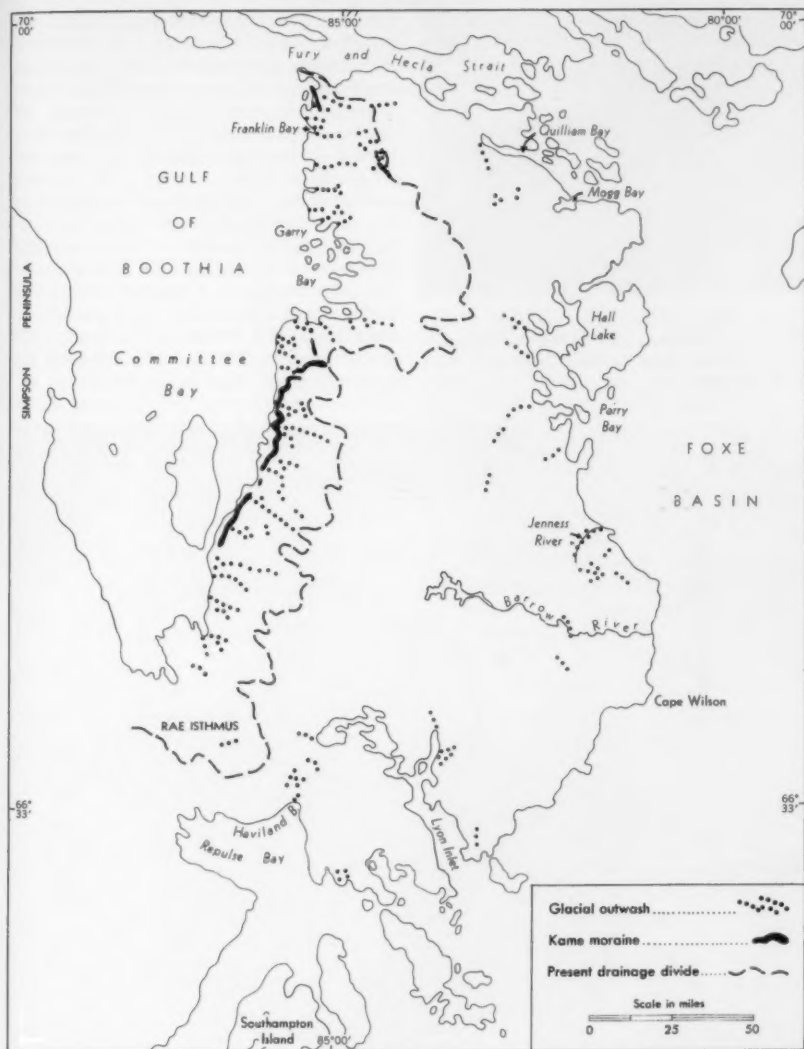


FIG. 7: Map of kame moraine and glacial outwash deposits in Melville Peninsula.

(Figure 7). What may be smaller segments of the same ridge have been mapped east of Franklin Bay. This ridge is the single most prominent feature of glacial deposition in the entire peninsula. It twists

and climbs over Precambrian hillsides to a maximum elevation of 1,300 feet in the north and drops nearly to sea level across the coastal lowlands at its southern end. In some places the constituent material



FIG. 8: Large, well-rounded boulders of Precambrian crystalline rock on the west slope of the prominent kame moraine. (Ground Photo V.W.S.-1958-9-17.)

consists of almost spherical crystalline boulders up to four feet in diameter (Figure 8). However, the most significant characteristic of the ridge is its steeply sloping and pronounced west-facing ice contact slope (Figure 9). Often this face is at a steep angle of repose and may be 50 to 75 feet high.

The nature of the material composing the ridge and the presence of the ice contact face suggest that it is a kame moraine formed at the eastern margin of an inactive ice mass lying over Committee Bay. The material appears to have been carried to the edge of the ice in east-flowing superglacial melt streams which dumped the materials at the base of the ice.



FIG. 9: Aerial view of kame moraine which extends along the west coast. Note the pronounced west-facing ice contact face south of Selkirk Bay. (R.C.A.F. Photo A15352-66.)

OUTWASH

Outwash gravel and sand occurs as valley train over distances of several miles in many of the west coast valleys (Figure 7). At what appears to be the upstream source point of this gravel, a gentle ice contact slope often dips upstream near the present stream divide marking the approximate margin of the ice at the time the outwash was deposited. Above the limit of marine submergence⁵ the outwash is composed of unstratified, well-rounded crystalline cobbles and boulders in which kettle depressions are locally common. Below the limit of marine submergence the character of the outwash changes abruptly. Here, stratified fine sand and gravel have been dissected by recent stream action and are characterized by flat-topped terraces and terrace remnants having an overall upstream gradient of about 2 degrees (Figure 10). These characteristics suggest that the outwash was deposited in the heads of estuaries on the west coast when the sea level in Committee Bay stood several hundred feet higher than it does at present. As the sea level fell, the outwash was dissected and redeposited at progressively lower elevations.

The presence of the kettles indicates that the outwash was deposited while small residual blocks of ice still occupied the valleys. The west-flowing subglacial and supraglacial drainage area must have been small, for when the ice front retreated east of the divide, little, if any, additional outwash was deposited.

Much smaller quantities of outwash occur in the eastern and southern valleys (Figure 7). Why this should be so is unknown. The east-flowing glacial drainage area was much larger than that flowing

to the west, and large quantities of outwash would be expected. In the east, most of the outwash sand and gravel, particularly that in the valleys of the Jenness and Barrow rivers and north of Haviland Bay, is found in association with eskers and glaciofluvial gravel.

ESKERS

Most of the eskers in Melville Peninsula are low, short, and segmented. They are found in peripheral areas and are often oriented at right angles to the general trend of the nearest coast. The pattern of their distribution roughly radiating outward from the interior suggests that they were formed near the margins of an ice cap lying over the peninsula (Figure 11).

Those eskers which occur west of the present stream divide formed in glacial melt streams flowing to the west. They are few in number because the terrain is high and dissected and a well-developed subglacial drainage system could not form. Moreover, once the ice margin had retreated east of the stream divide the remaining ice lay on an easterly sloping land surface which impeded subglacial drainage.

The eskers elsewhere in the peninsula formed more recently than those in the west. Those north of Haviland and Repulse bays and east of Lyon Inlet appear to have been formed in association with glacial streams flowing south and southeast to the margins of an ice mass in that area.

In the east the eskers distributed north of Barrow River and in the vicinity of Hall Lake were probably formed in streams flowing northeast and southeast respect-



FIG. 10: Stream-cut deposits of outwash sand near mouth of stream flowing into Franklin Bay. (Ground Photo Panorama V.W.S.-1958-25-1, 2, 3.)

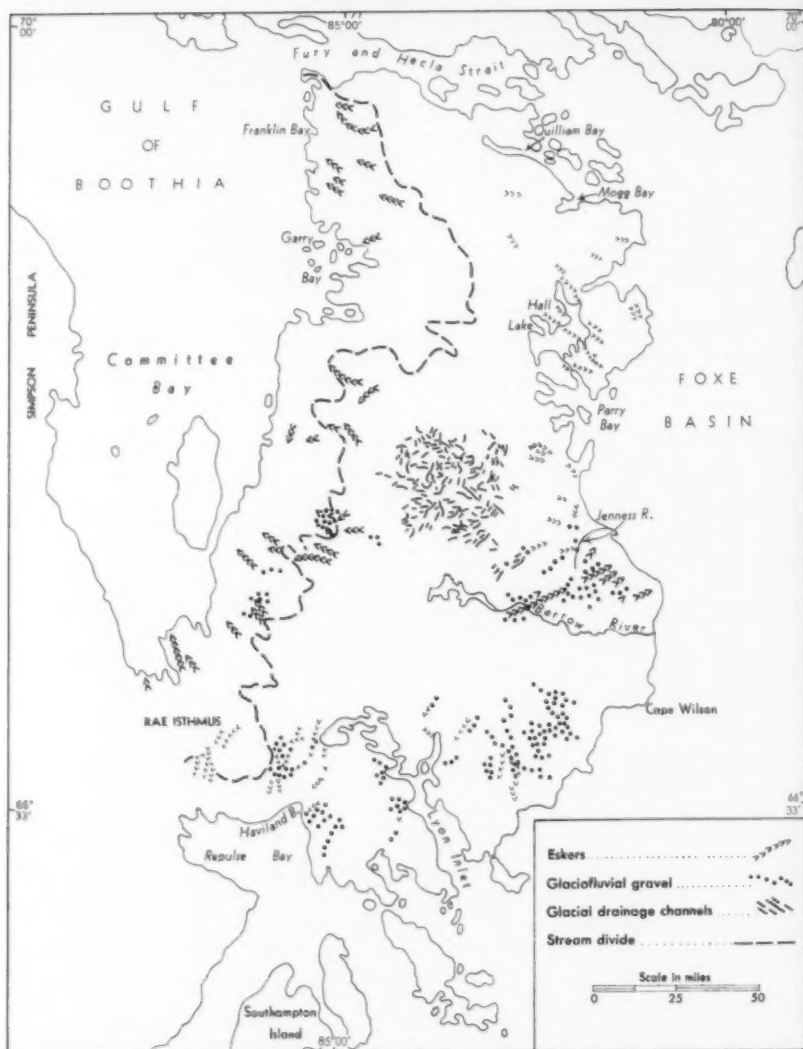


FIG. 11: Map of eskers, glaciofluvial material, and glacial drainage channels in Melville Peninsula.

ively toward a re-entrant ice margin in the region of what is now Parry Bay. It is possible, however, that at the time these eskers were formed, ice over the northern portion of the peninsula had already separated from a larger mass to the south.

A comparatively large number of eskers formed on the Palaeozoic lowland because the flat to gently rolling terrain favoured subglacial stream flow.

In addition to the eskers described above, other glaciofluvial deposits related

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to eskers are widely distributed in the shallow valleys leading southeast to Foxe Basin between Lyon Inlet and Cape Wilson. Pitted, linear deposits of rounded, crystalline gravel similar to the material found in the eskers extend along the southeast-northwest trending valleys. This material was deposited by glacial streams flowing to the southeast under or just in front of an ice margin. Smaller amounts of similar material are found in association with the eskers west of Lyon Inlet and north of Haviland Bay.

GLACIAL DRAINAGE CHANNELS

Glacial drainage channels occur in large numbers and are well preserved in central Melville Peninsula (Figure 11). They are similar in many ways to drainage channels found elsewhere in the eastern Arctic and in northern Quebec. In the peninsula, the channels occur individually, in groups of two or three, or in flights of twenty or thirty occurring in parallel alignment up valley slopes and hillsides (Figure 12). They are localized west of Parry Bay in an area of low, rounded Precambrian hills separated by wide, shallow streams. The common surface material in the vicinity is a coarse, angular ablation moraine; thus the cleanly etched drainage channels stand out in obvious contrast to the general appearance of the landscape.

Late in the glacial period, meltwater streams under, on top of, and near the margin of a remnant ice mass west of Parry Bay flowed with such speed and volume that channels of considerable size

seem to have been formed quickly. A roughly integrated drainage system to the east is indicated by occasional forks in the larger channels and by the acute angles at which tributaries join the main channels. The final glacial centre in the peninsula was confined to the area roughly demarcated by the channels indicated on the map.

SUMMARY

The glacial movements discussed here took place when deglaciation was well under way in northeastern North America. At that time, small, local centres of active ice dispersal developed. One of these lay in the area of eastern Foxe Basin. A smaller independent ice cap may also have existed on Southampton Island, or in northern Hudson Bay, at roughly the same time, as Bird suggests.⁶

Two major directions of ice movement across the peninsula are clearly indicated. North of Rae Isthmus (Figure 13.1) movement appears to have been across the peninsula in a west-northwest direction. A study of drumlinoids, roches moutonnées, and crag-and-tail features suggests this conclusion. Swaths of limestone-charged ground moraine tailing out towards the west from the eastern sedimentary lowland, and a decrease in the number of sedimentary erratics with increasing distance west across the upland, also support the theory of east-to-west glacial movement. An eastward projection of the line of general trend of these glacial indicators suggests that the source area for the ice lay in southeastern Foxe Basin.



FIG. 12: The mouth of a prominent glacial drainage channel cut in Precambrian crystalline rock in central Melville Peninsula. (Ground Photo Panorama V.W.S.-1959-28-4, 5, 6.)

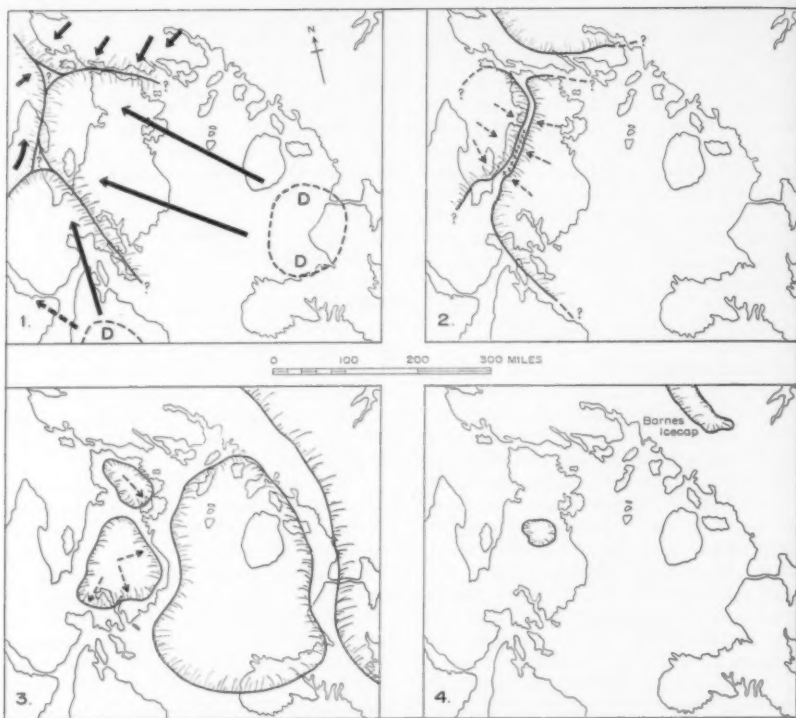


FIG. 13: Map of glacial stages during the "Wisconsin" in Melville Peninsula.

A second major direction of glacial advance is indicated on Rae Isthmus. Here drumlinoid topography with a pronounced southeast-northwest alignment apparently resulted from movement to the northwest from a dispersal centre on Southampton Island or in northern Hudson Bay.

Whether or not the ice moving west-northwest from Foxe Basin and northwest from Southampton Island were contemporaneous in their passage across the peninsula is difficult to say. The apparent absence of any interlobate material in the area north of Haviland Bay suggests that they were not precisely so; the more recent movement may have removed in its passage any debris left by the earlier one in the area over which it passed.

Over most of the peninsula, then, the most recent ice movement appears to have been westward and northwestward as a

broad lobe extending at its maximum from the latitude of Fury and Hecla Strait southward to at least the latitude of Repulse Bay. It may have been this ice which prevented south-moving ice in northern Baffin Island⁷ from crossing Fury and Hecla Strait or, if the north Baffin ice had previously crossed, which removed any evidence of southerly movement on Melville Peninsula.

How far west the ice advanced is unknown. No glacial flow lines or movement indicators appear on Wales Island. The few which appear on Simpson Peninsula suggest an ice movement there from south to north. But it seems reasonable to assume that ice from a Foxe Basin-Northern Hudson Bay source covered Committee Bay, portions of Simpson Peninsula, and the southern part of the Gulf of Boothia.

To the north, the Melville Peninsula ice

mass probably merged in the vicinity of Fury and Hecla Strait with west- and southwest-flowing ice from northern Baffin Island. In the south it may have met ice moving north from northeastern Keewatin. Finally, it seems possible that an interlobate area existed in southern Gulf of Boothia between the Melville Peninsula-Foxe Basin ice and ice moving in a northeasterly direction over Boothia Peninsula.

When final ablation began in late "Wisconsin" time, the ice appears to have melted by downwasting. As the ice thinned, the high backbone of the peninsula was the first area to emerge. This event separated ice over Committee Bay from the larger mass over the peninsula and Foxe Basin. A kame moraine formed at the eastern margin of the remnant mass in Committee Bay (Figure 13.2).

With continued eastward retreat of the western margin of the peninsular ice, the west coast valleys were exposed and filled with outwash. Contemporaneously the west coast eskers were formed. These features were all built, however, in a comparatively short period of time. Ablation soon placed the western edge of the ice east of the stream divide, and subglacial and proglacial drainage to the west was impeded.

As the Wisconsin glacial stage drew to a close, the melting of vast amounts of ice to the south raised the sea level, flooding low-lying areas. Sea water probably lapped about the edges of ice in Foxe Basin, hastened its melting, and separated it from the residual ice over the peninsula⁸ (Figure 13.3). The eskers and outwash material north of Repulse Bay and Haviland Bay, north of Barrow River, and on the eastern Palaeozoic lowland all formed in meltwater streams flowing radially to the ice margin at this stage.

Finally, the ice on the peninsula divided into two portions: a small remnant cap in the north, and a larger mass centred southwest of Parry Bay. The northern mass was the first to disappear. Ice remained longest in the area covered by ablation moraine and glacial drainage channels west of Parry Bay (Figure 13.4). Here lay a heavily drift-charged ice mass from which drained torrential, east-flowing glacial streams capable of cutting the channels. By that time the ice over Foxe Basin itself had dis-

appeared and the present Barnes Icecap on Baffin Island had shrunk almost to its present size.

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RÉSUMÉ

Des traces de phénomènes glaciaires appartenant au Wisconsin inférieur ont été observées dans la Péninsule de Melville et résulteraient d'un faible avancement d'une masse de glace couvrant le Bassin de Foxe et la partie méridionale de l'île de Baffin. Ce mouvement à travers la péninsule a probablement suivi deux directions. Au nord de l'Isthme de Rae, l'orientation aurait été O.-N.O. à partir d'une région-source située dans la partie sud-est du Bassin de Foxe. Sur l'Isthme de Rae, l'avancement, à partir d'un point dans la zone septentrionale de la Baie d'Hudson, aurait eu une direction N.O. A son maximum, la glace aurait recouvert la Péninsule de Melville et la partie de la Baie Committee située au sud de la latitude du Détroit de Fury et Hecla.

La disparition de la glace résulta de la fonte sur place. Les hauts reliefs de la partie occidentale de la péninsule émergèrent d'abord, divisant la masse de glace en deux lobes, dont l'un, le principal, occupait la péninsule et l'autre, plus petit, couvrait la partie méridionale de la Baie Committee. Une mo-

raine fut construite le long de la bordure orientale de ce dernier. Suivant la disparition de la glace et l'émergence des vallées de la côte occidentale, des sables et des graviers de lavage furent déposés dans la Baie Committee dont les eaux se maintenaient pour un temps à un niveau élevé. L'ablation graduelle amena la bordure occidentale de la masse de glace péninsulaire à l'est de la ligne de partage des eaux et l'écoulement des eaux de fonte vers l'ouest fut ainsi interrompu.

La montée du niveau de la Baie d'Hudson hâta la fonte de la glace dans le Bassin de

Foxe et des îlots de cette glace furent séparés du lobe couvrant la péninsule. Des lignes d'eskers radiaires furent constituées et la masse de glace résiduaire occupant la péninsule se divisa finalement en deux parties, au nord et au sud. La fonte du lobe septentrional fut rapide, tandis qu'au sud, la glace demeura assez longtemps sur une portion de territoire située à l'ouest de la Baie de Parry. Les lits de drainage que l'on peut observer aujourd'hui furent formés dans cette dernière région par des torrents et des cours d'eau coulant soit sous la glace, soit en bordure.

OTTAWA'S GREENBELT AND ITS ANTICIPATED EFFECTS*

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WHEN HEINRICH VON THÜNEN in 1826 envisaged the ideal concept of an "Isolated State," a settlement scheme with a single city situated in the homogeneous hinterland of an agricultural economy, a diagnosis of the urban way of life was relatively simple and uncomplicated. Subsequently, however, with the accelerated rate of urbanization and with technological progress in rapid transportation, "isolation" gradually grew into an abstract idea, and urban diagnosis became progressively more complicated and integrated.

The envisaged ideal of the "Isolated State" was made applicable to the contemporary way of life when Ebenezer Howard enunciated his classic Garden City theory at the close of the nineteenth century. Howard's regional system of metropolis, greenbelt, and satellite towns, all nicely arranged in the natural setting of a perfect region, has become the dream of many architects and town planners. There are, however, few places in the world where this ideal has been converted into practical realization.

The Greenbelt, the most important component of Howard's scheme, attempts to tackle the worst of the multitude of problems facing our "exploding metropolises." With increasing mobility, followed by the mass displacement of rural population into urban centres and by mushrooming suburban developments, the city structure has lost the convenient compactness it had in the era of animal-powered transportation. Railways, the internal-combustion engine, and hard-surfaced roads have become the major agents of urban decentralization. The metropolitan invasion of the countryside eventually created an ever widening transitional zone separating urban and rural life. Thus the urban-rural fringe, another problem-child in the urban family, was born; its uncontrolled development, inadequate or uneconomic services, low tax revenues, and social, school and transpor-

tation problems became burdens upon the parental city. A promising means of arresting this uncontrolled and costly peripheral development appeared to be girdling the bursting city with a belt of protected open space: a Greenbelt.

OTTAWA'S GREENBELT

The first complete application in North America of this planning solution to sporadic and uneconomic spread of fringe development is being undertaken by the federal government of Canada. Through the acquisition of land forming the peripheries of Ottawa and Hull, south and north of the Ottawa River respectively, the government has initiated the Greenbelt solution. This land assembly project is approaching its final stage on the Ottawa side of the river, and similar assembly on the Hull side can be expected in the near future.

The part of the Greenbelt around Ottawa averages 2½ miles in depth and covers an area of roughly 57 square miles, or 37,000 acres. It runs in a continuous 28-mile arc around the planned urban limits of the capital, from the Ottawa River at Green Creek on the east to the river shore approximately two miles west of the city. The area within the large semi-circle formed by the inner boundary of the Greenbelt and the Ontario shore of the Ottawa River, comprises the city of Ottawa, the residential village of Rockcliffe Park, the town of Eastview, and suburban parts of the rural townships of Nepean and Gloucester. It is of interest to note that this total urban area consists of about 62

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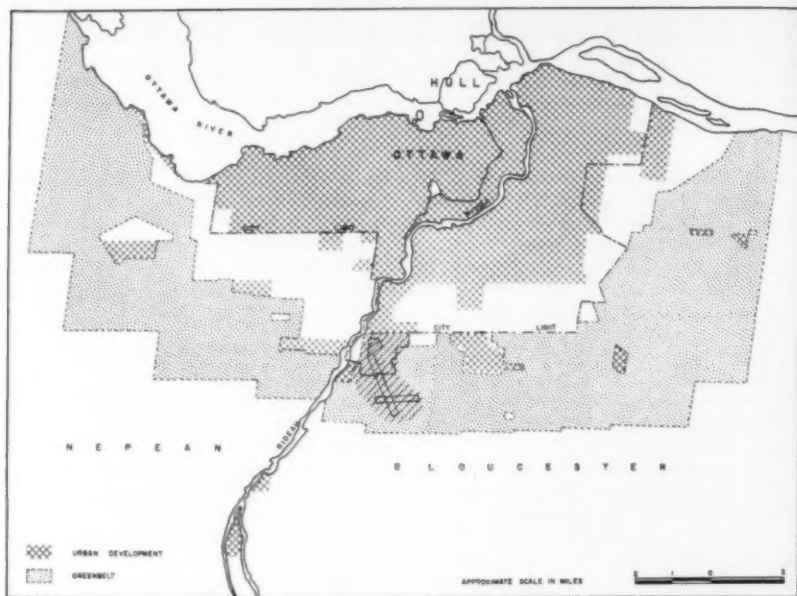


FIG. 1: Ottawa's Greenbelt, January 1960.

square miles, almost identical with the area of the Greenbelt lands which are designed to contain and protect the urban core.

ESTABLISHMENT OF THE GREENBELT

The creation of the Greenbelt is an integral part of an over-all plan for the national capital. Prepared in the period 1946-50 by the eminent French planner Jacques Greber, the principles of this plan very much resemble Ebenezer Howard's regional concept. The plan provides a broad pattern for the development of the National Capital Area which comprises 900 square miles. The area has the cities of Ottawa and Hull in its centre and a Greenbelt separating them from a mainly agricultural umland. Recently, the Area has been expanded to become the National Capital District of roughly 1800 square miles. Although the Greenbelt was actually the key to the achievement of the regional concept in the plan, it was not until 1958 that this major proposal approached implementation.

The story of its establishment reflects the typical twentieth-century planning problem: the central city, in its effort to finance service extensions in newly annexed areas, desperately tries to promote concentric, nucleated development; the abutting municipalities, in their efforts to resist annexations and metropolization, seek to encourage development at all costs, even though this usually takes the form of single family dwellings on large lots with septic tanks and wells. Obviously, such a conflict of interest between the central and the abutting municipalities operates against any agreement on a regional land-use plan.

In Ottawa, the legal regional planning power is vested in the Ottawa Planning Area Board, a body established under provisions of provincial planning legislation. Its jurisdiction includes all municipalities of the former National Capital Area on the Ontario side of the Ottawa River. In 1947, three years prior to the National Capital Plan, a proposal of Jacques Greber, then consultant to the Federal District Commis-

sion, for the establishment of the Greenbelt was adopted in principle by the Ottawa Planning Area Board. But power to implement the project through zoning control of land use under the terms of the Ontario Planning Act rested with the two adjoining rural townships of Nepean and Gloucester, within whose jurisdiction the Greenbelt lands lay. In the light of the aforementioned conflict between the central and the abutting municipalities, and in the absence of any policy of compensation for potential losses of tax revenue or for potential profit losses through intensive development of farm lands in the proposed Greenbelt, the two municipalities did not feel that they could co-operate.

Another means of implementing Greber's recommendation under provincial legislation was by a comprehensive land-use plan, that is, a master or official plan. However, such a plan did not exist. The existing "Greber" Plan of 1950 is not an official plan within Ontario legislation, but is, rather, a plan solely for guidance of general development and beautification of the National Capital Area on both sides of the Ottawa River. It cannot govern, and indeed is not a legal tool applicable to land use.

The Federal District Commission, realizing that all efforts to implement Greber's proposal through municipal zoning or an official plan would not succeed, in 1956 recommended to a Joint Parliamentary Committee that the Greenbelt lands be taken into federal ownership. This, they thought, was the only practical solution to its implementation. As the first direct action prior to outright purchase, Central Mortgage and Housing Corporation withheld loan insurance on proposed houses in the Greenbelt, thus effectively blocking most residential construction. The next and final step was taken in 1958, when the Federal District Commission was empowered to proceed with the Greenbelt land acquisition programme.

PURPOSE AND FUNCTION OF THE GREENBELT

Outright land purchase by the government was generally described as "meeting the problem of urban sprawl head on." When the inner limits of the Greenbelt were delineated, the physical practicability

of providing water supply and sewage disposal became the governing factor. Thus, one of the most important functions of the Greenbelt is to confine Ottawa's future expansion to the area in which the city can provide essential municipal services at reasonable cost. An additional water purification plant and a new sewage treatment plant are planned and designed on the basis of this consideration. Aside from a more intensive building development within the city, the girdled urban area would no longer swallow up adjacent farm and dairy lands and market gardens which feed the capital; unsightly ribbon development along approach highways, and uncontrolled sprawl, would become nightmares of the past—so it is hoped!

Another purpose of the federal government investment in the Greenbelt is to provide for "an extensive reserve of close-in lands, available as the need arises over the next century, for future government building sites, public and private institutions, and selected light industries requiring large areas, etc." (Federal District Commission, *Fifty-Ninth Annual Report*, 1958, p. 23).

Some importance has also been assigned to the Greenbelt's conservational aspects. It is believed that reforestation of waste lands and protection of stream courses and swamp areas will preserve the water table and thus ensure that lands both inside and beyond the Greenbelt will continue to have adequate water supply.

In summary, the permissive basic uses of the lands within the Greenbelt were described by the Federal District Commission, now the National Capital Commission, as follows: (1) existing farm occupancy, market-gardening, and woodlots; (2) existing and new federal uses in sites for government buildings, for which the Greenbelt will provide a long-term reserve of lands; (3) approved public developments on more than five acres, with ample boundary clearances, such as schools, universities, hospitals, and other public institutions; (4) park development of an informal nature; (5) private industry on minimum area of ten acres; (6) highway and railway rights-of-way; (7) some controlled suburban residential uses on large lots.

CRITICAL APPRAISAL OF ANTICIPATED EFFECTS

A closer look at present and anticipated developments on Greenbelt lands reveals that the belt of government-controlled open space is not, after all, as open as it is often misconceived to be. It would be more correct to describe the Greenbelt as a "low-density zone," acquired and operated with foresight by Ottawa's largest property owner, the federal government. Residential uses are not entirely banned from these 37,000 acres of government land. Small, hamlet-like suburbs and a number of residential subdivisions and individual houses with a total acreage of about 2,600 acres are dotted throughout the area. There are approximately 1,000 acres in railway and road use, with considerable extensions expected because of a highway relocation programme. Almost one-third of the Greenbelt, roughly 11,000 acres, is currently taken up by federal developments such as the Ottawa Airport, the National Defence Vehicle Proving Grounds and Test Ranges, the Dominion Experimental Farm extensions, and a number of smaller developments. As indicated by the federal government, further extensive developments of this type are foreseen in the future.

As for industrial uses, 75 acres of land in the western section of the Greenbelt have been sold to Northern Electric of Canada for construction of a research centre. There are strong hopes that more industries will establish similar centres, in spite of a change in policy according to which lands can no longer be sold, but must be leased to industries on varying terms. Of the remainder of the Greenbelt, roughly 7,000 acres are wooded and waste lands, with the balance, a little more than one-third of the total area, in active farm lands and market gardens. Thus, the ideal Greenbelt as visualized by Ebenezer Howard is already subject to lively modifications, some of them very urban.

A realistic appraisal of the Greenbelt's effects can be only a more or less educated guess, since its size and the delineation of its boundaries are based on predictions and assumptions. The governing factors in the regional planning programme, of which the Greenbelt is a key link, are: (a) the

predicted total population of the National Capital region, and (b) the settlement pattern most likely to occur.

a) Population

According to the *Fifty-Ninth Annual Report* (1958) of the Federal District Commission, the area defined by the Greenbelt's inner boundary then housed a total of about 277,000 people, and assuming no undue change in population density, the area could hold roughly 400,000. Further population expansions, the *Report* says, are expected to be absorbed by satellite towns outside the Greenbelt. The satellite towns are seen as enlarged existing or entirely new urban communities; they are to become self-supporting with "industrial and commercial activities sufficient to develop the adequate financial resources to equip themselves with municipal services, educational and recreational facilities and desirable urban amenities" (p. 22).

Since the 1958 *Report*, construction has continued its rapid pace, and population increase did not slow down so as to comply with predictions and verify assumptions. In view of most recent developments and in the light of a realistic appraisal of trends and patterns, the ideal scheme of a "perfect region" becomes slightly distorted.

Although the *Report* of 1958 had no time label attached to its population predictions, its assumptions provided the basis for the establishment of the Greenbelt in its present form and size which appear to be rather permanent. Since then, a new population forecast of about 1,000,000 people by the year 2000 for the National Capital region has been generally accepted by various planning agencies concerned. It is also generally agreed that some 780,000 of the expected million will reside on the Ontario side of the Ottawa River and the balance of about 220,000 on the Quebec side.

On the basis of existing land-use patterns and zoning, including approved and proposed subdivision plans for most of the developable land suitable for residential uses inside the inner limits of the Greenbelt, the total capacity of the belted area is estimated at approximately 400-430,000 people by the year 1980 or sooner. This implies that the bulk of all raw land now

available will be fully developed by that date.

It is generally agreed that raw land, once committed to a specific residential density, will so remain for at least fifteen to twenty years, depending on economic pressure, before converting to higher densities. It is also known that new apartment developments in older parts of cities are frequently accompanied by a gross decrease in the population of the over-all area affected, because of the loss of residential areas to other uses, changes in population structure, and municipal zoning controls. For example, in the four central wards of Ottawa, population has declined steadily over the last ten years, in spite of intensive apartment construction. The same decline appears evident in central areas of Toronto.

Consequently, it appears realistic to assume that the area inside the inner limits of the Greenbelt, when fully developed, will not experience an excess of 430,000 people by 1980. (This estimate coincides with a conservative calculation of roughly 2.5 per cent average annual increase of Ottawa's population for that period.) According to this calculation of density and the probable development pattern of the remaining urban land available, in relation to the realistic and accepted total population figure of 1,000,000 for the region, the year 2000 will then find about 350,000 people residing outside the outer limits of the Greenbelt on the Ontario side of the national capital area.

In summary the population figures are:

1,000,000 people	National Capital region by year 2000
220,000 people	Quebec portion of National Capital region, including city of Hull
780,000 people	Ontario portion of National Capital region
430,000 people	inside inner limits of Greenbelt by year 1980 (Ottawa urban core)
350,000 people	outside outer limits of Ottawa Greenbelt by year 2000 (= overflow of urban area)

b) Distribution Pattern

According to the Federal District Commission *Report of 1958*, the urban area's

overflow will follow a distribution pattern that is basically in line with Howard's classic concept, that is, the emergence of self-supporting satellite towns dotted throughout the region. A careful examination of recent developments in the region, however, gives reason to believe that subdividers and potential home owners do not abide by this concept. The capital's major industry is the federal government, and the bulk of the working force consists of civil servants and armed forces personnel. Like most Canadians, these people desire their own homes. Obviously, their demands greatly influence the real estate market. When selecting their homes, with increasing frequency they choose locations outside the outer limits of the Greenbelt; they seem to see no obstacle in a low-density belt, two miles wide, between home and place of work. Why should they, since by car it can easily be negotiated in a few minutes? Moreover, with the government carrying out a major decentralization programme of its functions, many of its employees may be closer to their places of work if they live outside the Greenbelt. Thus, lack of controlled development on the rural side of the Greenbelt and disproportionate land prices on the urban side promote much premature and disorderly severance of rural land. The assessment-hungry rural townships offer little resistance to such increase in their tax revenue. They seem to forget that their communities are destined to be the nuclei of self-contained satellite towns and thus permit developers and civil servants obsessed with home-ownership to transfer productive farm areas and potential industrial-commercial sites into ever growing residential dormitories of the capital.

Another factor influencing the settlement pattern is that Ottawa is at present taking strong measures to attract industry. Huge tracts of land in the southeast part of the city, immediately bordering the inner limits of the Greenbelt, have been zoned for industrial uses. By the time all this industrial land is actually ready for industrial uses, the residential land in the city will long since have been taken up by normal expansion. Future industrial employees probably will not hesitate to establish themselves on relatively cheaper

lands immediately outside the Greenbelt, which also may have the advantage to them of a shorter journey to work. The same argument applies to prospective industries permitted on Greenbelt lands. (It appears realistic to assume that Ottawa's urban area will continue to be the main employer of its regional labour force.)

CONCLUSION

It can be concluded that the anticipated effect of the Greenbelt may result neither in the satisfactory establishment of self-contained satellite towns, nor in a satisfactory prevention of urban sprawl. It appears inevitable that without an active programme of planning control by the local municipalities involved, or by the province, a large proportion of the 350,000 people anticipated as residents outside the Greenbelt will be found on physically suitable and desirable lands around it, with marked attenuated agglomerations located east and west along the Ottawa River, and south along the Rideau River. Such developments could be serviced by new sewer systems dependent on Ottawa and Rideau River drainage areas or with the help of technological advances in waste disposal. The land in these areas appears highly desirable residentially, and any objections to its development, other than physical disadvantages, are likely to be short-lived, thus allowing its full residential development.

In the opinion of the writer, Ottawa's urban growth will ignore the "five-minute belt" of low density, will jump it and continue its stampede across the countryside. Wherever the physical nature of the land permits, the urban spill will bubble over the two-mile rim and will eventually girdle the girdle.

RÉSUMÉ

Le système classique d'aménagement régional, comprenant métropole, ceinture de verdure et villes-satellites, d'abord conçu par

Heinrich von Thünen en 1826 et formulé ensuite de façon pratique par Ebenezer Howard, sera réalisé partiellement pour la première fois sur le continent nord-américain par la création d'une ceinture de verdure autour d'Ottawa. Après plus d'une décade d'étude, le gouvernement fédéral a décidé de mettre ce projet à exécution.

La Commission de la Capitale Nationale est à acquérir environ 37,000 acres de terre principalement agricole, à la périphérie des villes d'Ottawa et de Hull, à même le territoire de chacune des deux provinces bordant la rivière Ottawa. Cette initiative a trois buts principaux: l'aménagement de sites pour la construction future d'édifices gouvernementaux, la création de cadres pratiques et économiques pour circonscrire les constructions urbaines à forte densité, la prévention de l'expansion urbaine linéaire en bordure des routes de banlieue.

Suivant la théorie de Howard, l'excédent urbain serait absorbé par des villes-satellites de fonctionnement autonome. Ces dernières seraient créées de toutes pièces ou encore résulteraient de l'expansion et de la transformation de villes-dortoirs existantes. L'objectif ultime de la Commission de la Capitale Nationale est ainsi d'établir une zone urbaine assurant l'intégration complète des éléments géographiques, économiques et sociaux.

Entre-temps, l'occupation de tout le territoire disponible à l'intérieur des limites d'Ottawa se fera très rapidement. Le prix des terrains situés dans la zone qu'enclera la ceinture de verdure projetée a atteint des chiffres très élevés déjà et les fermes qui sont à la périphérie immédiate de cette ceinture sont rapidement acquises pour fins de spéculation. De plus, les noyaux urbains existants autour desquels pourraient croître les villes-satellites qu'on envisage se gonflent rapidement de quartiers domiciliaires où se logent l'armée toujours grandissante des fonctionnaires, et leur fonction de villes-dortoirs continue ainsi de s'amplifier.

Cette ceinture de verdure deviendra-t-elle effectivement la première initiative efficace vers la réalisation du type d'aménagement hiérarchique tel que formulé par Howard? Est-ce que, au contraire, l'essor de l'expansion à faible densité qu'on a connue jusqu'ici sera tel que la ceinture sera tout simplement ignorée et enjambée?

GEOGRAPHY IN THE SCHOOLS, UNIVERSITIES, AND EVERYDAY LIFE OF THE SOVIET UNION*

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THE SPECTACULAR DEVELOPMENTS in mathematics, physics, chemistry, and technology in recent years have pushed many branches of knowledge into the background, including, beyond doubt, geography. It is natural, therefore, that geography should seek new ways of developing its science to make it more fitted to this century of great technical and mathematical achievements, and of victories of man over the forces of nature.

Geography made substantial strides in the period of the great geographical discoveries. It again acquired widespread significance at the time of the development of steam transportation, and the exploration of the continental interiors. And by the end of the last century another important step was taken when an understanding of the conformity of nature to geographical laws on a large scale was attained. From this, a series of important quantitative indices for the development of the geographical environment were evolved.

In Russia, the results of the first period of development of geography were summed up by I. Kirillov, V. Tatishchev, and M. Lomonosov in the eighteenth century. The greatest representatives of geography in the second period were P. Semenov Tyan-Shanskiy and N. Przheval'skiy. V. Dokuchayev and A. Voeykov opened a new epoch in the development of Russian geography, through the establishment of a series of geographical laws—laws of the development of natural zones of the world—and a number of concepts concerning the interrelations of climate with other elements of the geographical environment, and so on.

Before the 1917 Revolution the scientific university school of geography of D. Anuchin was founded. Many of its scholars were eminent scientists, of whom L. Berg was particularly distinguished. After the

October Revolution, many scientists, including geographers, were enrolled by the Soviet government to carry out the enormous tasks of completing plans for the development of the productive forces of the U.S.S.R., of studying natural resources, population, and economy, and of preparing maps and atlases. In Petrograd (now Leningrad) in 1918 a special Geographical Institute was organized; this became the Geography Faculty of Leningrad University in 1924. In 1922, a Scientific Research Institute of Geography was founded in Moscow University.

Geographical concepts are so wide that their origins are by no means necessarily found only within the walls of special geographical scientific institutions. For example, in the early years after the October Revolution, as in subsequent years, significant geographical concepts were originated by the geochemist V. Vernadskiy (the biosphere theory), the mineralogist A. Fersman (theory of geochemical foci and the complex use of their natural resources), the botanist N. Vavilov (the theory of world centres of origin and world resources of cultivated plants), the soil scientist B. Polynov (the theory of the origin and development of the crust of weathering), the specialists in energy G. Krzhizhanovskiy and I. Aleksandrov (the theory of energy-production regions), the geographer L. Berg (the theory of "landscapes"), and the forestry experts G. Morozov and V. Sukachev (the theory of forest as a unitary whole with its surrounding environment from which the theory of biogeocenosis was later developed).

Together, all these theories revealed nature as a single whole, displayed the complicated real and objective links of

*Address delivered to the Ontario Geography Teachers' Association, O.E.A. Centennial Convention, Toronto, 20 April, 1960.

natural phenomena, and led to extensive and complex investigations of territorial combinations of natural resources. In these investigations, the first question concerned the commensurability of natural and production processes; that is, it encompassed the enlistment of natural energy and natural raw materials on a grandiose scale in the organization of areal productive complexes within the various economic regions of the country.

After the 1917 Revolution, geography in the U.S.S.R. became a more active and constructive science. Thus contemporary geography, as the science of the geographical environment of human society and its material production, not only describes this environment, but also explains its origin, regional peculiarities, and interrelation with society and its economic production. Furthermore, and most important, geographical studies help to change the geographical environment by demonstrating the best method of using its resources to achieve a higher level of development and the most rational areal organization of productive forces.

Expeditions to study the complex of natural resources and productive forces in different regions of the country have become a widespread form of areal research in the U.S.S.R. The extensive expeditions organized by the Council for the Study of Productive Forces of the Academy of Sciences, in Yakutiya, Kazakhstan, the Pamirs, the Kola Peninsula, the Urals, the Altay, and many other regions, are especially notable. In the post-war years, the Geography Faculty of Moscow University, alone, has conducted a series of intensive geographical studies in Eastern Siberia, the Lower Volga area (Caspian lowland), the Central Black Earth region, Eastern Kazakhstan, and a number of areas around Moscow, amongst many others.

As a result of such numerous and complex geographical investigations, most of which have practical significance for the economy of the U.S.S.R., the theories of Soviet geography began to be further developed. The geographical approach to the study of productive forces of the country as a whole, and of its economic regions, found expression also in the pecu-

liarities of geographical teaching in schools, universities, teachers' institutes, and other institutions. In this connection, great contributions have been made by the Soviet geographers N. Baranskiy, N. Kolosovskiy, A. Borsov, and S. Kalesnik.

Soviet geography, and in particular the teaching of geography, depends in a high degree on the achievements of cartography, which are found mainly in the series of maps of natural conditions of the U.S.S.R. and in the remarkable Soviet atlases. The theoretical successes in the field of cartography of K. Salishchev, A. Preobrazhenskii (in economic cartography), and others are worthy of note here.

Every science has its own material object of research which it studies from the point of view of both development and distribution. For the geographical sciences, such material objects are the areal complexes of the earth's surface (zones and regions), the natural complexes, and the complexes of productive forces. Just as there is a continuous exchange of matter between nature and the productive forces of society and just as productive forces in their development lean on the forces of nature and, in their turn, alter natural complexes, so too between natural and productive areal complexes there exist strong reciprocal connections. These connections, which exist objectively, also unite the various geographical sciences into one family.

In both the schools and universities of the Soviet Union, the principal focus of geography is on the study of the links between natural phenomena, population, and economy in different countries and regions of the world, and on the regional study of nature and productive forces in the U.S.S.R.

In the U.S.S.R. at the present moment, teaching in schools is being reorganized in the direction of closer links with life. Until recently, geography was taught in schools only in the fourth to the ninth grades.¹ According to the latest project, proposals have been made to alter the structure of the school geography course. In the primary grades, geographical material is to be included in "nature study." In the fifth grade an elementary course of physical geography will be introduced. In

the sixth and the first half-year of the seventh grades, a course on the geography of world regions and major countries will be given. In the second half of the seventh and in the eighth grades, courses will include the geography of the U.S.S.R., and in the senior group, the tenth grade, a course on the economic geography of foreign countries will be given. Finally, in the eleventh grade (the highest in school education) the economic geography of the U.S.S.R. will be studied in detail.

In the new geography curricula for schools, great attention is being paid to the work of the teacher and his pupils in the study of the geography of the school locality (area-study), its natural conditions, and its population and economy. Attention is also being paid to practical work, that is, to giving young people experience essential in life (for example, in drawing plans, in the practical use of maps, in weather observations, and so on), in order to teach them to recognize and consider in full the local natural and economic conditions.

At the third Congress of the Geographical Society of the Soviet Union (Kiev, 1960), the question was raised in discussion of what was the main orientation in the teaching of geography in schools. Should it become a polytechnic discipline, comparable with physics and chemistry, or is its main task to develop the general culture of the people, on a par with literature and history? The general opinion was that the teaching of geography in school had somewhat lost its cultural significance, but this cannot be considered valid. Geography, together with literature and history, educates the younger generation in a spirit of love of one's motherland and a respect for other peoples of the world. Together with this, of course, geography must give practical knowledge and skills in the evaluation and use of local natural and economic conditions, in the over-all economy, in their orientation in the locality, and in reading maps of various kinds and scales, and so on. In this century of rapidly developing technology, geography must not forget that the new technology is changing various aspects of the geographical environment greatly; nor must it forget that even the most highly perfected

machines must be well adapted to the surrounding environment.

The double significance of geography (both its cultural aspects and its directly practical importance to the economy) is particularly strongly reflected in the development of university geography. In 1960, geographers are being trained in 30 out of 40 universities in the U.S.S.R. In these universities there are Faculties of Geography (18), Faculties of Geology and Geography (5), Faculties of Biology and Geography, or Departments of Geography in Faculties of Natural Sciences (7). In addition, 60 Teachers' Institutes (out of 200) prepare teachers of geography, for the most part in Faculties of Biology and Geography, which graduate teachers of two subjects—biology and geography. Thus in the U.S.S.R., 90 higher educational establishments prepare specialists in the field of geography (or geography-biology).

The division of work between the universities and the teachers' institutes has not yet been sufficiently defined. If the teachers' institutes have a perfectly clear aim—to prepare teachers of geography and biology, and, in some cases, of geography and history—the universities have a dual aim—to prepare both teachers of geography and geographical specialists for the national economy. To prepare teachers of geography, one specialization is needed—"geography" (25 universities)—but to turn out specialists for the national economy, narrower specializations such as "Physical Geography," "Economic Geography" (4 universities), "Geomorphology," "Cartography" (3 universities), "Hydrology," "Meteorology and Climatology" (5 universities), and "Oceanology" (2 universities) definitely are required. In Moscow and Leningrad universities these specializations are further broken down. For example, in "Physical Geography" specialists are trained not only in physical geography as a whole, but also as geobotanists, zoogeographers, soil geographers. Polar specialists, and glaciologists.

Experience shows that the more a geographer is specialized, the easier it is for him to find himself a place at once in the national economy of the country. But at the same time a great danger arises that later in his career the young specialist

leaves geography, and becomes only one of its "neighbours."

In the U.S.S.R., university graduate geographers of various specializations work in the following fields of the national economy of the country:

Physical geographers work in cartographic institutions, in reservations, and in organizations for land evaluation. Some are Polar specialists working in Polar stations or in institutions for the study of permafrost, some are soil geographers engaged in land evaluation organizations, others are geobotanists working with geological exploration parties (the vegetation cover serves as an indicator of mineral resources lying at depth), or with organizations estimating natural fodder resources, and still others are zoogeographers located in reservations, in epidemiological stations, or engaged in studies in the field of medical geography.

Economic geographers work with regional councils of the national economy, in oblast planning commissions, in organizations for town planning, regional planning, planning of hydro-electric stations, thermal electric stations, communications, chemical combines, building-material industry, and certain organizations for the planning of agriculture. They also do some work in cartographic institutions.

Geomorphologists participate in geological exploration parties, in organizations for planning towns and communications, and in organizations which plan ports and their physical maintenance.

Hydrologists work in establishments of the Hydro-Meteorological Service of the U.S.S.R., and in organizations which plan hydro-electric stations, drainage systems and waterways.

Climatologists work mainly in establishments of the Hydro-Meteorological Service of the U.S.S.R.

Cartographers are employed in establishments and cartographic offices of the Chief Directorate of Geodesy and Cartography, as well as in planning organizations.

Oceanologists find work on ships, in ports, and in establishments connected with the fishing industry.

At present, the majority of geography graduates from the universities work as

teachers of geography and a minority work in the national economy. But in the course of time, the latter group will increase in number.

The national economy of the U.S.S.R. is growing at a very rapid rate. It is sufficient to say, for example, that in 1928 the electric stations of the country produced 5 billion kw. hours of electric power; in 1940, 48.3; in 1950, 91.2; in 1958, 233.4; in 1965 production of electricity will reach 550 billion kw. hours; in 1970, 900, in 1975, 1500 and in 1980, 2300 billion kw. hours. Spectacular progress has been made in the development of new electric-power stations (the Bratsk station on the Angara, now under construction, will have a capacity of 4.5 million kw. and the Krasnoyarsk station on the Yenisey, 5 million kw.), oil refineries, chemical combines, open-cast coal pits, opencast pits and shafts for iron ore, metallurgical and engineering factories, textile combines, and new agricultural areas. With the planned control of the national economy of the U.S.S.R. and with the system of integrated use of natural and economic resources over wide areas of the economic regions of the country, a practical demand has arisen for geography specialists who have at the same time a sufficiently broad outlook. The fulfilling of practical tasks demands in the highest degree such many-sided geographers—men who have acquired knowledge in *several* branches of geography. For example, for regional planning and planning of towns, geographers are needed who are well trained in economic geography and in geomorphology; for land evaluation, geographers trained in soil science, physical geography, cartography, and economic geography; for rational management of forestry, geographers trained in botanical geography, hydrology, and economic geography; for planning water-economy systems and waterways, geographers trained in hydrology, climatology, and economic geography; and so forth.

In other words, it has become necessary to have not only narrow specialists in separate branches of the science for similarly separate branches of the national economy, but also many-sided geographers, who will advance the "frontiers" of the different branches of the science. It is

recognized that the greatest achievements of the present time are precisely here on the "frontiers" of sciences. Geography is altogether "marginal"; it penetrates deep into many contiguous sciences and, moreover, its own branches overlap each other greatly. Therefore geographers can approach the study of natural and economic phenomena in a new, fresh way, giving an explanation for them completely different from earlier ones. Here is one of the most powerful advantages of geography, which, however, it has not yet succeeded in utilizing to the necessary degree to strengthen its position in the national economy. The complex geographical approach to actuality is still so unusual for the practical worker and for many scientists, accustomed to the narrow sectional mentality, that it is difficult for broad geographical ideas to pave a way for themselves in the national economy and in science. But the demands for the integrated geographical method of areal organization of productive forces will become so strong that there is no doubt geography has a great future.

In defining the place of geography in practical life, in science, in university and school teaching, great significance is attached to the degree of internal unity of the geographical sciences. This question is being discussed among geographers of many countries, including the U.S.S.R. Such a discussion is in part set forth in a recent article by D. Hooson.² Since it is not always possible to define differing positions sufficiently accurately, when standing to one side, an attempt to describe briefly how they appear to one directly involved in discussions presently being carried on in the U.S.S.R. will be made here.

There are three points of view in the discussion of the unity of geography:

1) In the course of differentiating geography into separate sciences, geography itself died out and in place of the former mighty tree was formed a young thicket, where each of the young saplings develops completely independently of the others. Many of the former branches of geography no longer have any relationship to geography; economic geography belongs to the economic sciences, cartography to

applied mathematics, geomorphology to the geological sciences, biogeography to the biological sciences, and so on. Under the name of the geographical system of sciences, there is a qualified concept of an aggregation of sciences, each of which is concerned with the study of geographical distributions of some phenomenon of the earth's surface. Since the laws of the geographical distribution of industry, tectonic faults, molluscs, religions, and diseases are, of course, completely different, there can be no question of talking about any internal unity of geography.

2) The differentiation in geography has proceeded so far that it has weakened geography itself, and has broken it into many parts having little connection with each other. This fragmentation has caused both the national economy, which needs wide geographical generalizations, and particularly the culture of the people, to suffer severely. The general cultural role of geography has started to decline. Geography must once more become "unified," that is, it must cut off its numerous "branches" and limit itself to the fostering of general geographical work.

3) The differentiation of geography is regular and progressive. None can "embrace the unembraceable," but each branch of geography studies not the geographical distribution of various phenomena, but rather definite material objects—areal complexes (natural and productive)—developing in a specific geographical environment and under known historical conditions. Physical geography studies the laws of development of the geographical environment both as a whole and as areal complexes; geomorphology studies the laws of development of the solid surface on which the geographical environment is developed; climatology studies the climatic differences of the geographical environment; hydrology investigates the water resources of that environment, and so forth.

The character and level of productive forces and social relationships define the relation of society to nature, the kind of influence of nature on the development of production, and the kind of influence of people on the surrounding environment. Natural resources become the productive

forces of society; the productive forces of society enrich the surrounding nature and become an inalienable part of the geographical environment. Productive forces are included in the natural circulation of matter; the exchange of matter between man and nature expands continually. Economic geography studies areal combinations, differences, and peculiarities of productive forces. The connections and interpenetration of nature and the productive forces of society define also the connection and interpenetration of physical geography and economic geography. Cartography reflects in its characteristic graphical way the areal combinations and the interaction of the geographical environment and productive forces.

Thus geography as a whole, as a system of sciences, has not died out, since clearly the geographical environment as a whole continues to exist, and the mutual relations between it and human society and production become ever more powerful, complex, and areally differentiated. The differentiation of geography in conformity with natural phenomena does not by any means signify its dying out. When we talk of the unity of geography, we mean by this the unity of the system of geographical sciences and we do not at all deny the independent significance of physical geography, economic geography, and cartography, with all their rapidly developing branches. We do not propose to cut off these branches and limit ourselves to "unified" geography. The unity of the geographical sciences is the unity of any area of the earth's surface on which both the geographical environment and human society with its production are developed. It is the mutual connections and interpenetration of the geographical environment and productive forces. It is also the areal complex method of research by which various areal complexes of phenomena, of differing kinds and scales, are studied. The unity of the geographical sciences in a practical sense is reflected in integrated field work, in complex atlases, in the wide development of different kinds of evaluation studies of economic importance (evaluation of natural resources, evaluation of land, evaluation of areas for the construction of towns, of large industrial com-

bines, of electric-power stations, and so on), and in the writing of studies of regional geography.

Such a detailed statement of the third point of view shows that it is dear to the writer. This point of view of the unity of the geographical sciences, as against attempts to "give away" in all directions with the liquidation of geography itself, and as against the replacement of the whole aggregation of interconnected geographical sciences by a "unified" geography, is upheld by a group in the Geography Faculty of Moscow University and by the majority of other Soviet geographers.

This very unity of the geographical sciences, their mutual penetration, and the community of methods permit the geographer, without loss of face and without standing to one side, to instill his own achievements into the most varied fields of the national economy, culture, education, and science. At the same time, he may make use of the achievements of contemporary science and technology. We realize clearly that the separate sciences of the geographical system study different laws of development, natural and social. The unity of the geographical sciences does not mean the transfer of the laws of development from one field (nature) to another (production), or vice versa. The dialectical method of research does allow the study of development of the geographical environment, society, and production, in conjunction and in mutual connection, while encompassing these connections in a "single viewpoint."

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RÉSUMÉ

La géographie a en U.R.S.S. une longue histoire qui s'est enrichie des travaux de distingués hommes de science, géographes et autres. On conçoit présentement cette discipline comme la science du milieu géographique où évolue la société humaine et où cette

dernière se livre à des formes variées de production matérielle. La géographie ne doit pas seulement décrire ce milieu, mais elle doit aussi expliquer son origine, ses particularités régionales de même que ses rapports avec la société et la production. De plus—et c'est un point très important—les études géographiques contribuent à modifier le milieu naturel en indiquant d'abord les méthodes les plus appropriées d'utilisation des ressources en vue d'un développement optimum et ensuite les lignes directrices d'une répartition ordonnée des moyens de production.

Dans les écoles comme dans les universités de l'Union Soviétique, les études géographiques portent surtout sur les rapports entre les phénomènes naturels, la population et l'économie dans les divers pays et régions du monde de même que sur les milieux naturels régionaux de l'U.R.S.S. et leurs moyens de production. Dans les universités, l'enseignement est présentement en voie de réorganisation de façon à établir des rapports plus étroits entre la géographie et la réalité planétaire et régionale. On veut mettre l'accent sur la double importance de cette discipline, comme science de l'homme et comme instrument de développement économique. En 1960, la formation de géographes se poursuit dans 30 des 40 universités de l'U.R.S.S. et les candidats se préparent à devenir ou bien professeurs de géographie ou encore géographes professionnels travaillant aux fins des intérêts économiques nationaux.

Le développement rapide de l'économie soviétique et la mise en oeuvre d'une politique de planification intégrale à l'échelle régionale comme à celle de la nation ont créé un besoin urgent de géographes, les uns devant travailler comme spécialistes dans divers domaines de recherche bien déterminés et les autres devant prendre une vue d'ensemble des phénomènes

naturels et économiques susceptibles d'influer sur l'économie nationale. Bien que les travaux géographiques ne soient pas encore toujours appréciés à leur juste valeur, la géographie a de plus en plus droit de cité et son avenir en Union Soviétique est très prometteur.

On discute beaucoup en divers pays de l'unité de la science géographique. A ce propos, les géographes soviétiques s'entendent à reconnaître la validité des trois propositions suivantes:

1. En voulant partager le domaine de la géographie entre diverses disciplines, on en vient à annihiler la géographie elle-même.

2. La compartimentation à outrance ne peut qu'affaiblir la géographie.

3. La division de la géographie en spécialités doit être graduelle et progressive. Chaque spécialité ne doit pas se livrer uniquement à l'étude de la répartition de phénomènes variés, mais aussi à celle d'objets matériels bien définis contribuant au développement de milieux géographiques particuliers dans un contexte historique connu. La géographie, dans sa conception d'ensemble et comme discipline, est donc toujours bien vivante puisque le milieu géographique continue d'exister et les rapports mutuels qui s'exercent entre milieu, société humaine et production deviennent sans cesse plus complexes, plus puissants et les variations dans leur répartition sont de plus en plus marquées.

Le dernier de ces trois points de vue est à l'honneur à la Faculté de Géographie de l'Université de Moscou et chez une majorité des géographes soviétiques. Il permet l'étude complète du développement du milieu géographique, de la société et de la production, individuellement et dans leurs rapports mutuels. L'ensemble complexe de ces liens et de ces rapports peut ainsi être exprimé par un seul terme et un seul point de vue.

Review Article

THE ST. LAWRENCE SEAWAY

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BULLOCK, F. J.: *Ships and the Seaway*, J. M. Dent & Sons (Canada) Ltd., Toronto, 1959.

CHEVRIER, L.: *The St. Lawrence Seaway*, Macmillan Co. of Canada Ltd., Toronto, 1959.

HILLS, T. L.: *The St. Lawrence Seaway*, Methuen & Co. Ltd., London, 1959.

JUDSON, C. I.: *St. Lawrence Seaway*, Follet Pub. Co., Chicago, 1959.

MAYER, H. M.: *The Port of Chicago and the St. Lawrence Seaway*, University of Chicago Press, Chicago, 1957 [University of Toronto Press].

MASSENA OBSERVER: *The Billion Dollar Story*, Annual Publications 1956-9, Box 69, Massena, N.Y.

BOOKS ABOUT THE SEAWAY should describe its history, construction, and function. The balance between economic forces should be examined objectively for the past and the present; the rivalry between Montreal and New York, between rail, road, and water, and the resulting peculiar geographic and economic features of the seaway should also be critically analysed.

By these criteria, three of the seaway books mentioned here can be dismissed at once. C. I. Judson's *The St. Lawrence Seaway*, L. Chevrier's *The St. Lawrence Seaway*, and F. J. Bullock's *Ships and the Seaway* are primarily picture-books without very many pictures, although the last book has some useful pictures and information about ships. These books are for people who want to own a book about the seaway, but don't care which one. They are suitable gifts for people one doesn't know very well, or they might serve as souvenirs. The annual publications called *The Billion Dollar Story*, published by the *Massena Observer*, are infinitely superior picture-books, because they include enough pictures to give a clear account of the various phases of seaway construction.

The two books which must be con-

sidered more seriously are *The St. Lawrence Seaway* by T. L. Hills and *The Port of Chicago and The St. Lawrence Seaway* by H. M. Mayer. These books have pictures and maps similar to those of the others, but they also have more satisfactory reading material. Professor Hills's primary interest is the seaway, while Professor Mayer is intent on displaying the potential wonders of Chicago.

There is some confusion in all these books as to whether or not water transportation is entirely economically worthwhile in many cases. The authors extol the merits of cheap ocean transportation, but then try to show that the seaway involves less ocean transport, since some ports in the seaway area are closer to Europe than some Atlantic ports. If this is true, then these Atlantic ports have an advantage for low-cost bulky products, the rail journey being shorter and the ocean voyage longer. The authors should keep in mind that a shorter sea voyage is not always an economic advantage, as the classic mistake of constructing Prince Rupert has shown.

The historical section of Hills's book contains a number of oversights, and in the reviewer's opinion is not as accurate as it might be. For example, Lake Erie was not unknown to Europeans in the seventeenth century, because Brûlé is supposed to have visited it in 1616, and a map of the Great Lakes was published in 1643. Mention of Kingston as La Salle's headquarters might have been made in discussing the work of this explorer, and the early seaway via the Rideau and Ottawa canals received no comment. Steamboats were not able to travel up the Long Sault Rapids in 1833, and the struggle between the North West Company and the Hudson's Bay Company was by no means the first economic battle involving the St. Lawrence.

On the other hand, Hills's discussion of the great economic and geographic forces operating for and against the seaway is quite good. He makes the mistake of other authors, however, in supposing that these forces evaporate as we approach the present. In fact, the depth of the seaway and the toll structure are the grounds on which the struggle is now taking place. The very existence of tolls is a triumph for New York City and the railways. Canada did not charge tolls on the Welland Canal, and was in favour of making the seaway a public benefit, comparable to harbour dredging or the construction of airports. Hills's remark, "But somebody has to pay for this convenience, for undoubtedly it is a form of subsidised transport," accepts the railway point of view, and shows a lack of understanding of the seaway as it might have been. An inquiry into accounting methods might get to the heart of this matter. It is a remarkable coincidence that the proportion of seaway and power project costs which was charged to the seaway resulted in toll charges (to cover interest and capital repayments) which seem to prevent any serious threat to railway traffic. In its first season, seaway traffic was below all estimates. It should also be noted that tolls are high on package goods, which railways like to carry, and low on iron-ore, coal, and grain.

Railways and ports with vested anti-seaway interests cannot be expected to see or argue the possible benefits of the seaway to the North American economy. Both Hills's and Mayer's books would have been more useful had they pointed this out. It could be argued that if revenue from sale of electric power can pay off two-thirds of the whole project cost in fifty years, it ought to be able to pay for the seaway third of the cost in another fifty years. The battle of the seaway, involving North American economic and geographic factors, is by no means over. There is ample room for a book which discusses various seaway possibilities, and perhaps even for a book advocating no tolls on the seaway. If the United States Department of Commerce takes over the American part of the seaway and tries to raise tolls, a book dealing with all aspects of the problem could be of immense public benefit.

Neither Hills nor Mayer comments on the interesting work of Mr. G. M. Humphrey. As President of the Hanna Coal Corporation he had been an opponent of the seaway; as a member of the Hanna-Hollinger Iron Company in Labrador he became pro-seaway. He happened to be Secretary of the Treasury when the United States government finally approved the construction of the seaway.

A Canadian myth, which it seems a shame to tamper with, is that Canada forced construction of the seaway by threatening "to go it alone." How could the Canadian government have built a dam partly in the United States and have flooded part of New York State, without permission from the United States? The fact that Canada could not construct a seaway herself, except perhaps via a gigantic new Rideau Canal, is reflected in the fact that Canada was forced to accept the toll-charging idea. Canada also had to accept the two American locks despite the fact that Canadian locks at Cornwall would have involved much less channel digging. The closure structure at Cornwall, where Canada may some day be allowed to construct two alternative locks, is a monument to the real economic power which anti-seaway forces still possess. The two American locks give the United States government the right to discuss the financing of the seaway, and the right to discuss what the tolls will be. This is not necessarily a political comment; it is merely to remark that the economic forces in the United States happen to be different from those in Canada. If there were no international boundary, there would still be an interplay of economic and geographic forces. Which nation is looking farthest into the future, and which has the benefit of the whole public most at heart, are questions which should be discussed.

Hills gives much basic information for such a discussion. His book, even though it has short-comings, should certainly be consulted; afterwards, one might read Mayer's book for a more circumscribed view of seaway questions. Mayer's book is adequate as far as it goes. He gives a thorough, workman-like discussion of ship traffic on the Great Lakes, the importance of types of ship and harbour, and the probable

economic results of the building of the seaway. Implications for Chicago and possible improvements in Chicago's five harbours are discussed in detail.

There is no book which gives a satisfactory detailed picture of how the seaway itself was constructed. Hills, again, comes closest to it, but his discussion is admittedly selective. It would be useful and worthwhile to have an informed engineering account, not written for engineers, of how each section of the work was done, and how one part had to be completed before another could be started. Visits to the seaway while under construction gave the impression of an almost symphonic co-ordination between bulldozers, pile-drivers, cement-mixers, sheep's foot rollers, Euclids, and The Gentleman. Yet it must have been more complicated than this. One guide remarked, "Seaway construction is always on schedule; when it's not, they change the schedule." Hills gives some helpful detail, but by no means a complete account of the most interesting engineering aspects of the seaway construction.

Mistakes were made, but these are scarcely mentioned in any of the books purporting to discuss the seaway. The greatest mistake would seem to be the moving of the town of Iroquois to its present site. There is now a park where the town originally stood. A low dike would have saved the town, but someone made a decision that it was not to be saved. Some American farmland was saved by dikes, but not a Canadian town. The planning of

the removal and rebuilding of various towns appears to have been autocratic and thoughtless. Houses were valued at their market value, rather than their replacement value. People who contested the assigned evaluation were eventually able to get much more for their houses—to the great annoyance of those who had been more co-operative. It is even reported from the seaway area that newspapers refused to publish any letters from irate residents. If this form of dictatorial thought-control existed in the seaway area, it should be recorded in books about the project. We should learn from our mistakes and not try to cover them up or ignore them. Books about the seaway are incredibly uncritical—they might just as well be discussions in *Soviet Weekly* of the building of the Volga-Dor project.

The power aspect of the project has not been much mentioned in this review. Everyone agrees on the desirability of more cheap electric power, and this is generally a non-controversial topic.

The books all devote space to discussing the future. Various tonnages and types of cargo are predicted. There is general agreement that the seaway will do more to give lake-boats access to Montreal and the Gulf of St. Lawrence than to admit ocean ships into the Great Lakes. But, in the long run, tonnage relative to external ship dimensions, tolls on various commodities, and regulations concerning ownership of vessels are the major factors which will determine the future of the seaway.

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